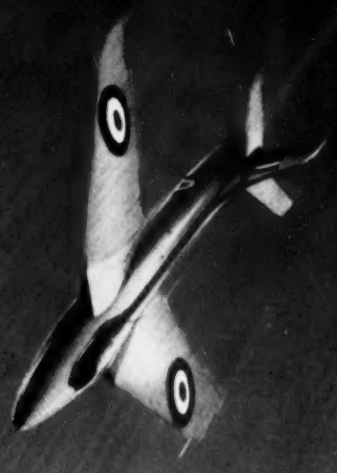
8 AUGUST 1952

ONE SHILLING

FLIGHT



The
HAWKER HUNTER
CELLON
AIRCRAFT FINISHES
Provide the supreme protection for high performance aircraft
in latest D.T.D. specifications

CELLON LIMITED KINGSTON-ON-THAMES ENGLAND TELEPHONE KINGSTON 1234 (7 LINES) TELEGRAMS AJAWB PHONE KINGSTON-ON-THAMES
ALSO MANUFACTURED IN AUSTRALIA, CANADA, FRANCE, HOLLAND & NORWAY

CELLON LIMITED, KINGSTON-ON-THAMES, ENGLAND TELEPHONE KINGS
ALSO MANUFACTURED IN AUSTRALIA, CA

Black & Decker
THE NAME BEHIND THE TOOLS
½" STANDARD DRILL
B & D Drill capacities range from ¼" to 1" in steel (double in hard-wood), with Hole Saws, up to 4" in sheet metals
Leading Distributors everywhere sell Black & Decker PORTABLE GRINDERS · SANDERS DRILLS · SCREWDRIVERS · ETC. VALVE RECONDITIONING EQUIPMENT & BENCH GRINDERS

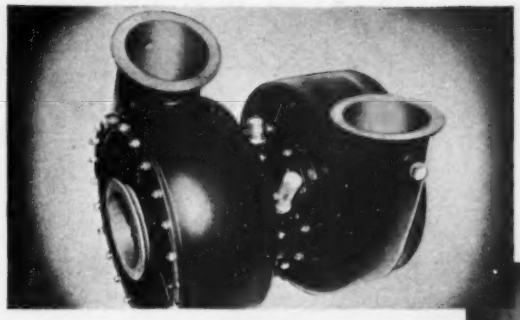
ONE OF THE TOOLS BEHIND THE NAME

Small drill, big drill, heavy duty, light duty . . . in the world's largest range of portable electric tools you'll find the widest choice of drills! The sixteen models cover every class of work—in almost every imaginable material, for every industry! When buying drills—when buying *any* portable electric tools—it really is important to specify Black and Decker.

The first choice of craftsmen the world over

BLACK & DECKER LTD. HARMONDSWORTH, MIDDX. PHONE: WEST DRAYTON 2681/7
LONDON · BIRMINGHAM · BRISTOL · GLASGOW · LEEDS · MANCHESTER · NEWCASTLE · NOTTINGHAM

Smee 1

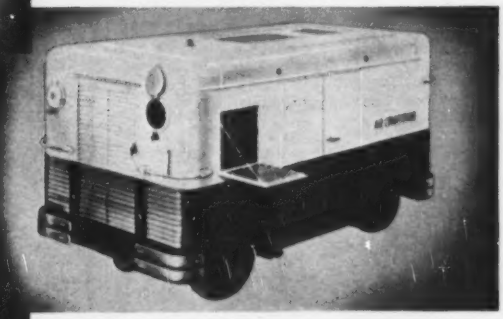


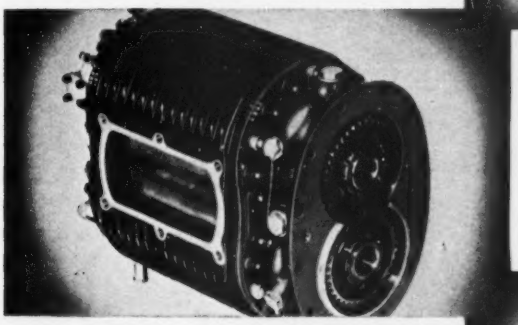
Cold Air Units

are installed in the air conditioning systems of pressurized aircraft to cool the ventilating air supplied to the cabins. Using the ventilating air as the working medium, these units are simple in operation and require little maintenance. Godfrey Cold Air Units are installed in the Comet, Viscount, Hermes, and many military aircraft.

Air Conditioning Trolleys

The Godfrey Type R 2000 has been supplied to B.O.A.C. for heating, cooling, deodorizing and pressure testing aircraft on the ground. This trolley can provide 300,000 BTU hr (minimum) for heating; a temperature drop of up to 90 deg F for cooling; and 1250 cfm of air at 12 psi for pressure testing.



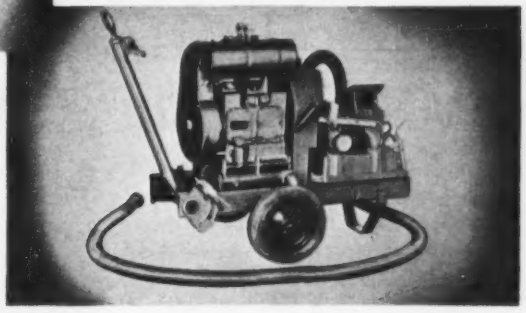


Cabin Superchargers

for pressurizing and ventilating aircraft cabins. Single stage and two stage models are in production —all operating on the Roots principle. Simplicity, reliability and economy in operation are the outstanding features of these superchargers. As an example, the Type 15 supplied for the B.O.A.C. Argonaut has an overhaul life of 2400 hours, approved by the A.R.B.

Pressure Testing Trolleys

We are specialists in the design of pressure cabin testing trolleys. The Mk. 1c illustrated employs an air cooled twin petrol engine driving a Godfrey Roots type blower. This trolley, designed for pressure testing medium size aircraft cabins, is robust, reliable and simple in operation. Typical performance: 70 cfm of air at pressures up to 10 psi.



GODFREY

SIR GEORGE GODFREY & PARTNERS LTD.

STAND NO. 148

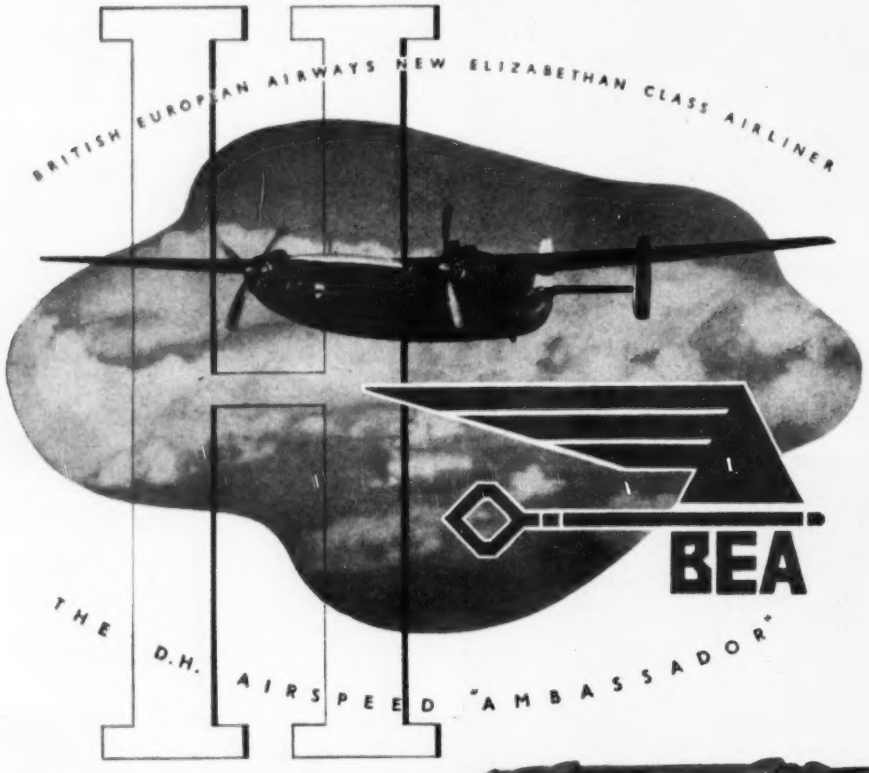
S.B.A.C.

EXHIBITION

HANWORTH, MIDDLESEX—HENLEY, OXFORDSHIRE

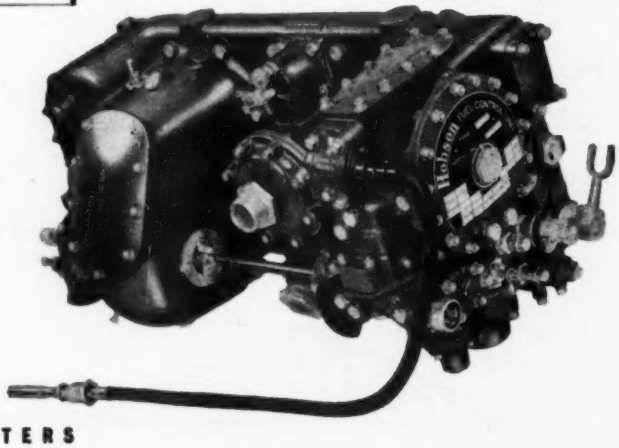
OVERSEAS COMPANIES, MONTREAL, JOHANNESBURG & MELBOURNE

Ambassador of Service



The latest addition to the fleet of aircraft in service with the B.E.A., the handsome Ambassador is now in regular operational use.

Its two Bristol Centaurus engines are fitted with Hobson B.C.15 Injection Carburetters—one more indication of the wide esteem in which Hobson equipment is held by aircraft and engine designers throughout the industry.



Hobson

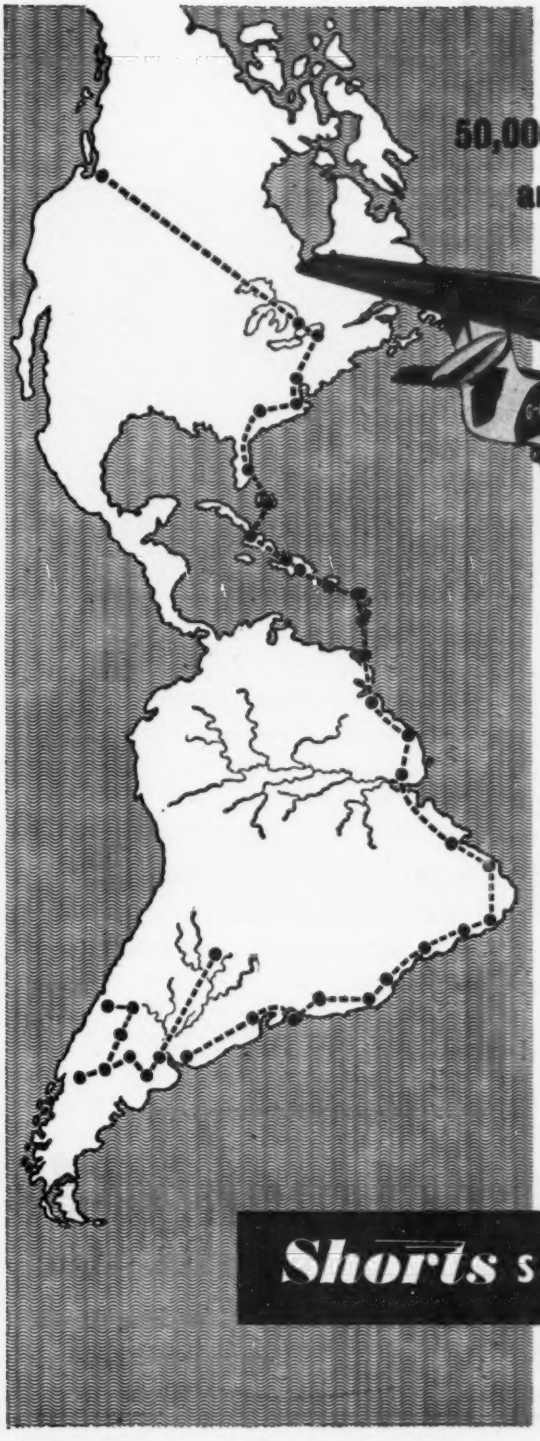
Master Control

INJECTION CARBURETTERS

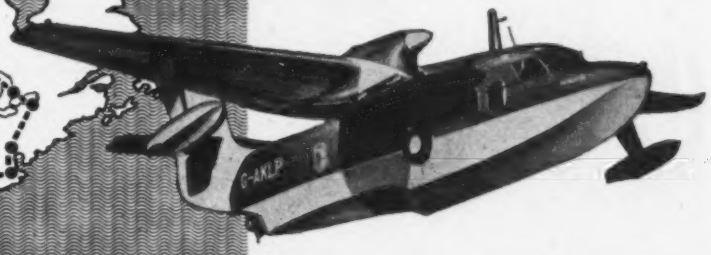
for maximum reliability and fuel economy

H · M · HOBSON LIMITED · FORDHOUSES · WOLVERHAMPTON

Licensees in U.S.A. & Canada: Simmonds Aerocessories, Incorporated



50,000 miles... over 500 take-offs and landings



... in all—a twelve-month trouble-free tour of demonstration through the American continents

From the time it left Trinidad in January, 1951, until the time it touched down in Montreal for its annual Certificate of Airworthiness in December of the same year, the sturdy Short Sealand, flying under some of the most adverse and extreme weather conditions — ranging from equatorial sun, through tropical storms, to temperatures below Zero — flew more than 50,000 miles and gave more than 300 demonstrations in its twelve-month tour.

All who flew in it, including many important officials of the numerous countries through which it passed, were high in their praise of its performance.

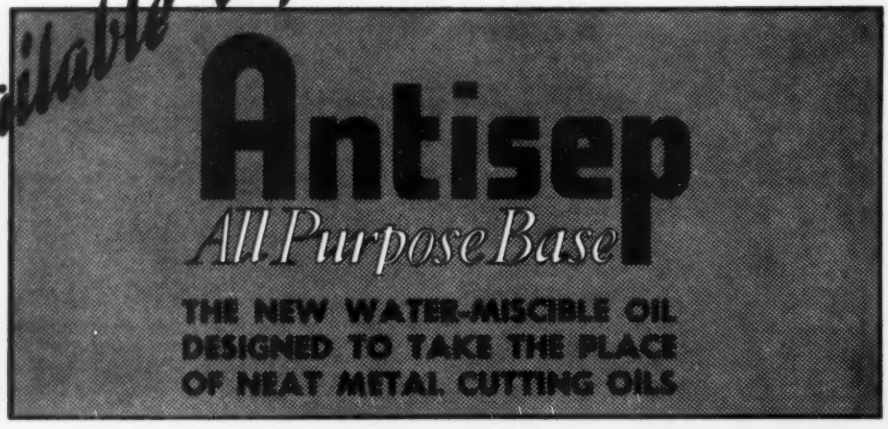
Proving consistently every claim made by its manufacturers, the aircraft flew into remote and formerly inaccessible places. It covered a multitude of duties ranging from freighting to fishing, and solved many of the problems facing various business concerns — just as other Sealands are successfully tackling unusual tasks in many other parts of the world to-day.

Shorts SEALAND AMPHIBIAN

Short Brothers & Harland Ltd., Queens Island, Belfast
London Office: 17 Grosvenor Street, W.1.

9/25

*Available Again!**



A notable advance in metal cutting oil technique, **Antisep** will cover almost every type of machining including the safe and efficient operation of *Automatics*—not formerly considered suitable for the application of water-soluble oils.

Antisep—the single concentrated Base—meets a wide range of operations at a cutting fluid cost of only 1/- per gallon. *Technical advice on request.*

*
Due to the raw material position the supply of **Antisep** has been severely restricted. Happily, conditions have improved and we now welcome new business.

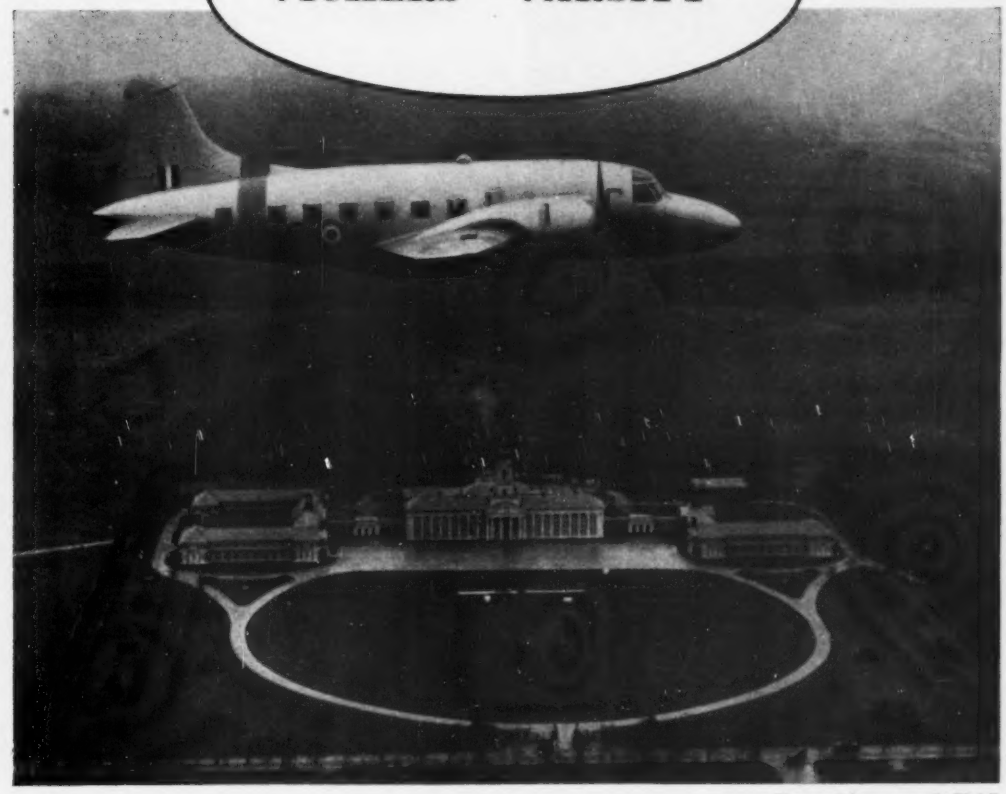
Antisep All-Purpose Base, with the amazingly high film strength, is a product of

Edgar
Vaughan
& Co. Ltd.

BIRMINGHAM · 4 · ENGLAND

WORKS AT:—BIRMINGHAM · MANCHESTER · SOUTHALL (MIDDX) · BRISTOL · LIVERPOOL · GLASGOW

VICKERS "VARSITY"



Photograph by courtesy of "Flight"

Applying the lessons of experience

The R.A.F.'s flying schoolroom is the Varsity. This advanced aircrew trainer provides complete facilities for training in piloting, air navigation, bomb-aiming and radio/radar signals.

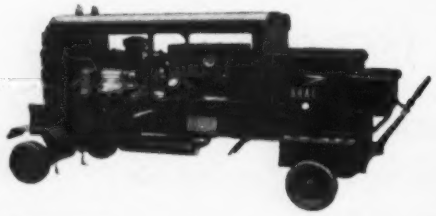
VICKERS-ARMSTRONGS LIMITED

AIRCRAFT DIVISION · WEYBRIDGE · SURREY

Photo: Walter E. Higham, F.R.P.S.

is vital with jets . . .
MUREX GROUND POWER UNITS
have power to spare

A flying start comes naturally to the small but sturdy little nuthatch. The starting of a powerful jet aircraft, however, is not quite so simple. Here, a quick and reliable method of starting the engine is essential. Murex ground power units have been specially developed to provide instant starting for all types of aircraft engines—piston, turbo-jet and turbo-prop. The standard units will supply a peak current of over 1,400 amperes for engine starting periods and a current of 600 amperes continuously at 28 volts for servicing and pre-flight checks. Other capacities are available. Murex units are engine-driven and thus they eliminate the expense of heavy service accumulators. They are used by B.O.A.C., B.E.A., and other world-famous airlines for the starting of all the latest types of aircraft.



MUREX AIRCRAFT GROUND POWER UNITS

MUREX WELDING PROCESSES LIMITED,
WALTHAM CROSS, HERTS. TELEPHONE: WALTHAM CROSS 3636.
GPU 13

Lockheed

DEVELOPS ADVANCED ELECTRONICS CENTRE

Secret and advanced designs of virtually every electronics manufacturer in the U.S. are constantly studied, correlated and put to work at Lockheed Aircraft Corporation's electronics centre in Burbank, Calif.

This centre is one of America's largest clearing houses for electronics intelligence. It was developed by Lockheed to provide the latest in this science of automatic controls for such Lockheed planes as the F-94, first U.S. All-Weather Interceptor; the WV-1 and WV-2, U.S. Navy Constellation radar sentinels; and deadly new models of the P2V U.S. Navy patrol bomber for anti-submarine warfare.

UNIQUE APPROACH

Lockheed's approach to electronics differs noticeably from many other aircraft manufacturers. At Lockheed the emphasis is on the application, not the manufacture, of electronics. That's because Lockheed begins the design of an advanced plane with the specific mission of the plane in mind. Knowing what the plane MUST do, Lockheed wants to be free to analyze *all* products of *all* manufacturers in order to obtain the most advanced electronic devices needed to accomplish this aim.

Lockheed does more than apply *existing* electronics. Often, no device is available to perform a specific job. At such a time, Lockheed scientists provide the all-important idea, frequently supplying the basic design for a new product. Then they turn it over to an electronics company for manufacture.

TYPICAL EXAMPLE

America's first All-Weather Interceptor, the Lockheed F-94, is a current result of Lockheed's policy. Not being a manufacturer of electronics, non-competitive Lockheed can work closely with companies who are, as well as with the U.S. air services. As a result the F-94 was *electronically at least two years ahead* of competitive aircraft.

This leadership is a principal reason why Lockheed is attracting so many top experts in electronics.

faster
than a cup of coffee

Lockheed Starfires

destroy an air invader

INCREDIBLE—but in less time than the few minutes it takes to drink a cup of hot coffee a Lockheed *Starfire* (F-94C) can

Take off from a cold start—

Climb 7 miles up in any weather—

Locate enemy bomber automatically—

Destroy the invader, without ever seeing it—

Furthermore, the 2-man crew need never have seen the bomber they destroyed.

Today these all-weather Lockheed jet interceptors are being delivered in the U.S. Air Force for 24-hour duty guarding U.S. borders and key cities. It gives the U.S. Air Force a fast-climbing jet fighter that is almost automatic—forerunner of planes that may actually fly and fight by themselves.

The *Starfire's* brain centre can locate invading bombers on the darkest, stormiest night. Its unique all-rocket armament can destroy the biggest bomber built.

The *Starfire* is another example of Lockheed design "stretch"—an engineering achievement of creating a more advanced model out of an existing aeroplane. This speeds development and production, also cuts cost. Forerunner of the *Starfire* is the Lockheed F-80 *Shooting Star* of Korean fame. Lockheed is the world's leading builder of jet aircraft.

Lockheed

Aircraft Corporation

Burbank, California and Marietta, Georgia

Look to Lockheed for Leadership

Anti-Submarine — Super Priority

FAIREY

THE FAIREY AVIATION CO. LTD. · HAYES · MIDDLESEX

FLIGHT
and
AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2272 Vol. LXII. FRIDAY, 8 AUGUST 1952

EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

TECHNICAL EDITOR
C. B. BAILEY-WATSON, B.A.

ART EDITOR
JOHN YOXALL

Editorial, Advertising and Publishing Offices:

DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1.

Telegrams, Flightpress, Sedist, London.
Telephone, Waterloo 3333 (60 lines).

Branch Offices:

COVENTRY
8-10 Corporation, Street.
Telegrams, Autocar, Coventry.
Telephone, Coventry 5210.

BIRMINGHAM, 2
King Edward House,
New Street.
Telegrams, Autopress, Birmingham.
Telephone, Midland 7191 (7 lines).

MANCHESTER, 3
260, Deansgate.
Telegrams, Iliffe, Manchester.
Telephone, Blackfriars 4412 (3 lines).
Deansgate 3595 (2 lines).

GLASGOW, C.2.
26b, Renfield Street.
Telegrams, Iliffe, Glasgow.
Telephone, Central 1265 (2 lines).

SUBSCRIPTION RATES
Home and Overseas: Twelve months £3 3s. 0d. U.S.A. and Canada, $10.00
BY AIR: To Canada and U.S.A., six months, $16

IN THIS ISSUE:

South Coast Race - - - 142
Battling Bantams - - - 147
Britannia
Pre-flight Testing - - 149
Low-flying Academy - - 153
Turbo-Liner - - - - 157
March of the
Rotorplanes - - - - 160

For Defence *and* Export

THE Prime Minister's speech in the recent debate on the economic position indicated the dilemma with which the Government is faced and the compromise solution proposed. Several passages particularly concern the aircraft industry. The country's state of solvency has first been weighed against its military preparedness; next, the allocation of the available manpower, steel and other essential materials to defence or export production has been considered. Lastly, it has been necessary to plan for several years hence, taking into account that, as Mr. Churchill said, "in the two years that have passed since the original rearmament programme was launched, some weapons on which immense sums were to be spent have become obsolescent and new types and devices of a greatly improved character have come into view." Because modern weapons take two or three years to make, and modern aircraft four or five, "it would be wasteful to the highest degree to spend many months re-tooling factories for rearmament and moving labour for that purpose and then . . . to break them up and disperse the labour.

"It seems," said the Prime Minister, "that priority is given to exports over defence, but the sphere in which the transfer of resources will be fruitful is a limited one." He also remarked: "Armaments are in these uneasy days best sellers; they find a ready and profitable market."

On the whole, the aircraft industry appears to have less to worry about than certain others. Good military aircraft are at once a vital contribution to home defence and to friendly export markets. Civil machines also help to build up our reserve air strength and are at the same time one of the most valuable and economical exports. Orders for both military and commercial aircraft assure the country of a strong and active industry.

Polychromatics

MUCH is heard of the efforts now being made to bring about international standardization—of units, procedures, regulations and, more particularly, of military training and equipment among the N.A.T.O. countries.

Aircraft are one of the most widely shared major items of military supply, British Vampires and Meteors in the markings of many European and other countries being a familiar sight. Their provision for, and adoption by, friendly air forces has automatically brought about a considerable degree of standardization. Experienced pilots have little difficulty in flying foreign aircraft, but the job is made more difficult by unfamiliar instruments and units, and in an emergency their actions might be a little slower.

Until, ideally, a more or less standardized cockpit can be worked out for each class of aircraft and standard units and presentations are agreed upon, it is our opinion that the adoption or extended use of colour quadrants on all instruments and the colour-coding of all services and controls is to be most strongly recommended.

There is little real value in memorizing the exact maximum and minimum operating figures for all the instruments in each individual aircraft; indeed, for the pilot who flies several types, it is almost impossible to do so. Moreover, so long as units differ to such a marked extent, there must be difficulty in remembering and visualizing readings and limits. The pilot may be faced with temperatures in degrees C or F; pressures in lb/sq in or kg/cm^2; speed in km/hr, m.p.h. or knots; rate of climb in m/sec or ft/min; and so on. All this would be simplified if every dial carried a green quadrant for normal readings flanked by, say, amber for maxima and minima in emergency, and red for dangerously high or low indications. These colours are internationally understood and are independent of language and unit differences; they provide, moreover, a check at a glance, without the necessity for any memorizing or process of deduction or conversion. The question of colour-blindness hardly arises, for it is a bar to professional piloting.

An extension of this scheme for colour indications on instruments is the colour-coding of services. For example, all controls concerned with fuel may be painted blue, and all emergency systems red. It is appreciated that these proposals have already been accepted by some manufacturers and applied quite widely. We cannot recall having heard a single adverse criticism of such schemes. Why not apply them universally?

SOUTH COAST AIR RACE

Two of Three Places for Italian Ambrosinis

Illustrated with "Flight" photographs

AUGUST Bank Holiday week-end does not seem to be a happy choice of date for air racing. This year the weather eventually cheered up to provide a fine, clear Saturday evening for the *Daily Express* Air Race, but at 2.30 p.m., the advertised time for the start, there was heavy rain, low grey cloud, and visibility of no more than a mile or two at best. In fact, it seemed that the conditions of the 1951 race day had been repeated exactly. Everyone badgered the met. men, of course, and they promised clear skies by 6 p.m. at Shoreham but had grave doubts about the Thanet end of the out-and-return course.

By mid-afternoon hopes rose as streaks of blue sky appeared in the south west. Spirits were further raised when the Navy and R.A.F. showed that "aviating" weather was returning, by flying representative jet aircraft over the coastal sections of the course. A nice formation of Attackers from No. 890 Squadron, R.N., swept by at a few hundred feet and later a single Canberra, representing Bomber Command, and four Meteor 8s of 500 (County of Kent) Squadron, R.Aux.A.F., flew over.

It was at ten minutes past six that word flashed round that the race was on, and almost at once early-off competitors made final preparations and, donning life-jackets, climbed into their cockpits and started up. Because there were 43 starters it was necessary to arrange the aircraft in two lines.

The majority of the aircraft were quite well known, having raced on many occasions before. There were eleven Proctors and Jean Batten's historic Gull, G-ADPR—flown by G/C. Bader—six Taylorcraft Plus Ds, including the King's Cup winner; one each of Austers, Autocrat, Autocar and Aiglet Trainer. It was appropriate that eleven Miles types should also be racing from Shoreham, where the company began its existence and to where it has lately returned. Among the few unusual types everyone was delighted to see the two Italian aircraft, the Ambrosini S.7, (this year powered by a Gipsy Queen 30) and the Ambrosini-Rondone F.4, with Walter Mikron 2 engine of only 65 h.p. These two, and the tiny Rondone in particular, added the only new look to a rather ageing field, for even the Swedish Safir has been a familiar, though attractive, visitor here for several years. The Rondone is a very modern two-seater, with retractable nosewheel landing gear, large canopy and small, thin wings.

It was pleasant, too, to see the little Moth Minor Coupé out again and to have a second Comper Swift taking part. This machine, G-ACTF, flown by Ron Clear, has been fitted with a tiny part-moulded cockpit enclosure; it also has long-chord spats. Nat Somers, who does not expect to race his Gipsy Gemini after this season, had taken off the fixed slats and fitted small end-plates to his flaps. The extended air intakes were off again.

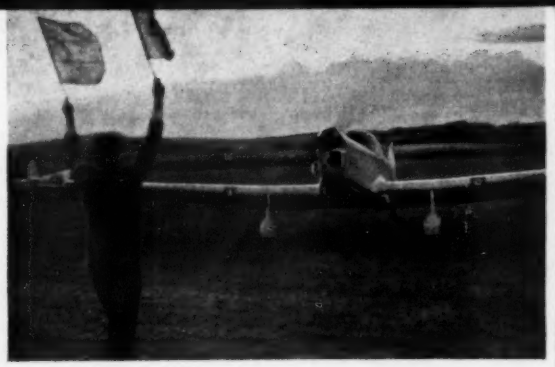
Indicative of the difficulties besetting pilots in search of a few more knots from detail aerodynamic improvements is the story, circulating at Shoreham, of Hugh Kendall. It seems that after several months' "scientific" work on his Chilton D.W.1—last year's winner—he found it to be 4 m.p.h. slower. Of the varied fleet of Proctors, *Nannie Anne*, No. 73, flown by Ron Paine's brother, A.S.K., looked and sounded as if it had enjoyed fraternal attention. H. J. G. Turner and A.Cdre. Adnams carried passengers. L. C. Marmol's Proctor I, OO-INT, made a spectacular climbing turn round the first pylon.

As always, the start provided a special kind of excitement arising from the tension and the many roaring engines. Mr. Philip Mayne gazed at his "instrument panel" time and time again, impassively raised and dropped his green flag to send another aircraft off on the 183-mile course round Reculver (near Herne Bay) and back coastwise to Brighton's West Pier.

Most pilots held their aircraft low, after having eased them off Shoreham's grass field early. The wind was strong and once the aircraft had rounded the first pylon to turn down-wind and east along the coast, they appeared to travel very fast. Some chose to stay very low while others climbed to a few hundred feet to try to obtain more benefit from the tail wind.

The first three aircraft away, a Tiger and two Plus Ds, left in formation with the Tiger leading on the run, but Mrs. Grace was first round the pylon. The tiny Rondone rumbled for a long way before getting airborne—with a jump as it seemed.

Take-offs then continued uneventfully until Bowles' Cirrus Major Messenger and Blumenthal's well-polished Hawk Major were flagged off together. The Messenger soon led by about two lengths on the run but the Hawk crossed over behind and might well have been in slipstream trouble. Capt. Bissmark took his Safir round the first pylon in a steep climbing turn. G/C. Bader



The winner, W/C. R. H. McIntosh, D.F.C., A.F.C., taxies in on his Percival Proctor 1 after landing back at Shoreham.

Congratulations all round. Left to right are G. A. Ferrari, who came second in his Ambrosini S.7 (Gipsy Queen 30); W/C. McIntosh; and V. Rosaspina, whose tiny Ambrosini-Rondone F.4 was third.

Pl.	Pilot, Aircraft, Engine	Start order	H'cap time m. s.	Finish time h. m. s.	Av. speed m.p.h.
1	W/C. R. H. McIntosh (Proctor 1, G.Queen 2) ...	28	27.20	1.37.27	157.5
2	G. A. Ferrari (Ambrosini S.7, G.Queen 30) ...	43	49.40	1.37.40	230
3	V. Rosaspina (Amb.-Rondone F.4, Mikron 2) ...	15	16.05	1.37.47	135
4	E. W. Westbrook (Messenger 4A, G.Maj. 1D)...	13	13.55	1.39.07	129.5
5	A. Cdre. G. Adnams (Proctor 3, G.Queen 2)...	24	25.25	1.39.08	150
6	S/L. J. Rusk (Falcon Six, G.Six)	37	35.40	1.39.13	173.5
7	G. A. Farley (Autocar, G.Maj. 1)	10	10.00	1.39.24	124.5
8	W. W. Lyle (Proctor 1, G.Queen 2)	33	29.35	1.39.28	158
9	A. S. K. Paine (Proctor 1, G.Queen 2)... ...	36	33.50	1.39.46	167.5
10	L. C. Marmol (Proctor 1, G.Queen 2)	30	28.30	1.39.48	155
11	J. P. Crowther (Proctor 3, G.Queen 2) ...	32	28.55	1.39.50	156
12	G. R. I. Parker (Proctor 5, G.Queen 2) ...	27	26.35	1.40.00	150
13	S/L. D. White (Proctor 5, G.Queen 2)... ...	29	27.45	1.40.04	153
14	G. Marler (Falcon Six, G.Six)	38	36.25	1.40.05	173.5
15	R. R. Paine (Hawk Speed Six, G.Six 1f) ...	42	43.55	1.40.16	196
16	J. N. Somers (Gemini 3, 2 G.Maj. 1C)	41	38.00	1.40.18	177
17	R. S. Spackman (Moth Min., G.Min. 1) ...	4	01.50	1.40.19	113
18	F/O. M. R. T. Chandler (Hawk Tr. 3, G.Maj. 1)	22	23.20	1.40.24	143
19	H. Blumenthal (Hawk Major, G.Maj. 1) ...	18	19.30	1.40.26	136.5
20	H. J. G. Turner (Proctor 3, G.Queen 2) ...	25	25.40	1.40.37	147
21	Mrs. Z. Irwin (Proctor 5, G.Queen 2)	30	28.30	1.40.40	153
22	F. Dunkerley (Gemini 1A, 2 C.Min. 2) ...	40	37.50	1.40.56	175
23	Capt. S. F. Bissmarck (Safir, G.Maj. 1D) ...	34	32.10	1.41.04	160.5
24	D. Donaldson-Stiff (Hawk Tr. 3, G.Maj. 1) ...	11	11.10	1.41.10	122.5
25	C. Gregory (Taylorcraft Plus D, C.Min. 1) ...	8	06.15	1.41.36	116
26	W. P. I. Fillingham (Moth Min. Coupé, G.Min. 1)	17	18.35	1.41.37	133
27	Mrs. Y. M. Grace (T'craft Plus D, C.Min. 1) ...	1	00.00	1.41.43	108.5
28	Miss E. L. Curtis (Wicko G.M.1, G.Maj.) ...	16	16.45	1.42.10	129.5
29	Capt. J. H. Christie (Leopard Moth, G.Maj. 1)...	14	14.55	1.42.39	126
30	R. E. Clear (Comper Swift, Pobjoy R)	20	19.45	1.42.55	132.5
31	D. F. Ogilvy (Comper Swift, P.Niagara 3) ...	21	20.20	1.43.01	133.5
32	P. B. C. sh (Autocrat, C.Min.)	7	06.00	1.43.07	113.5
33	D. R. Robertson (Moth Minor, G.Min. 1) ...	11	11.10	1.43.24	119.5
34	D. G. S. Cotter (T'craft Plus D, C.Min. 1) ...	8	06.15	1.43.45	113.5
35	W/C. C. M. M. Greco (Nighthawk, G.Six 2) ...	39	36.55	1.43.59	164.5
36	D. R. S. Bader (Gull, G.Six)	35	32.35	1.44.20	154
37	N. A. Harper (T'craft Plus D, C.Min. 1) ...	5	02.15	1.44.39	108
38	B. J. Snook (Tiger Moth, G.Maj. 1)	1	00.00	1.45.55	104.5

Retired: D. J. Bennett (Proctor 5); J. K. Quill (Taylorcraft Plus D); W. P. Bowles (Messenger 2A); T. H. Hayhow (Aiglet Trainer); H. Best-Devereux (Taylorcraft Plus D).

(Left) Attractive light-coloured dark horse was the Ambrosini-Rondone (65 h.p. Walter Mikron) seen here as it was flagged away. (Right) The Ambrosini S.7 flown by Ferrari was the last aircraft away, and thus had all but one competitor to pass in order to finish second at 230 m.p.h.

in the Gull seemed to accelerate only very slowly as if in coarse pitch. The ultimate winner, veteran pilot W/C. R. H. McIntosh, chief pilot of Airwork, Ltd., who has probably had more hours at the controls of aircraft than anyone else flying, made a routine take-off in his well-prepared though unobtrusive Proctor I.

When the turn came for the two Geminis to go, Dunkerley was away ten seconds before Somers, but the Cirrus Minors, which propel AKKB so fast in the air, take longer to get it airborne and so AKDC was already ahead at the turn, a mile from take-off. The two disappeared down the coast neck-and-neck in pursuit of Jimmy Rush and the other Falcon Six and the Nighthawk. Rush's black wings were like mirrors at the start.

In a 183-mile race the true effect of speed can be better appreciated for, although Paine's Speed Six is good for almost 200 m.p.h. and Ferrari's S.7 for 230 m.p.h., it seemed that they could not possibly have time to catch the long-handicap men doing their 105-110 m.p.h. The S.7 was giving the Tiger 49 min 40 secs.

By 7.30 p.m. all the aircraft were well on their way and Charles Gardner, with David Martin, were reporting progress. Mrs. Grace, of the Gatwick Penguin Club, was soon found to be ahead on time and to be leading the field; Westbrook's Gipsy Major Messenger was also going very well, Several of the machines had by this time completed the long land leg from Newhaven to a point near Herne Bay, and had rounded the historic Reculver Towers. The names of Marmol and Gregory next came up for mention, but Mrs. Grace still led. Knowing looks followed a later report that Rossapina's Rondone was moving up fast, for not only was this the dark horse of the race (and, with Ferrari, heavily backed), but its speed of departure down the coast had impressed everyone.

At half time the race for the line was developing : could Mrs. Grace hold the lead, or would Westbrook, Rosaspina, Adnams, Marmol or (now) McIntosh and Ferrari catch her? If so, which could do so quickest, for all were a little up on handicap time?

With the fast men moving up rapidly, Mrs. Grace eventually lost her long-held lead and other slow machines were left behind as they battled against the stiff breeze past Hastings, Bexhill and Beachy Head. Even so, it was difficult until very near the end to decide who would be among the first three at the Brighton Pier finishing-line. McIntosh, flying at 160 m.p.h., proved to be the man who could not be caught, and he finished just over half a mile ahead of Ferrari, with Rosaspina only seven seconds behind his fellow-countryman. There was a short pause after the winners had raced by, followed by a keen fight for the next eleven places, all the aircraft finishing within a period of one minute (as can be seen from the tabulated results). In fact, Westbrook took fourth place by only a second from A. Cdre. Adnams, and Jimmy Rush sixth place five seconds later. It was truly a success for the handicappers, especially when a further eight aircraft came in during the next 50 seconds.

And so the handsome prize of the *Daily Express* Challenge Trophy and £1,000 went to veteran W/C. McIntosh (and his ground crew), while £500 and £250 respectively were the prizes for the two Italians. Sums ranging from £100 to £10 were also won by all the competitors finishing down to 15th place. In addition the first woman, Mrs. Z. Irwin (Proctor 5) received £50.

ROUND THE LIGHTHOUSE

From a vantage-point at the tip of Newhaven Breakwater we watched the first black speck on the horizon transform itself into Mrs. Y. M. Grace's Taylorcraft Plus D, AHKO, which was already ahead of its two co-starters, Taylorcraft AHCR and Tiger Moth AMJN. The diminutive Moth Minor, flown by R. S. Spackman, appeared next, executed a very shallow turn and headed inland. Two more Taylorcrafts then came on the scene; XB, flown by H. Best-Devereux, had made up on its handicap, but seemed rather off course after the Newhaven turn.

The next machine to appear—AHGZ, C. Gregory's Taylorcraft—was, in true King's Cup style, already 17 sec up on its handicap. David Cotter, flying AHSB, passed by so low that many spectators were in grave danger of falling off the breakwater in their endeavour to catch sight of him.

G. A. Farley's Autocar, AJYY, which had given 10 min to the first Taylorcraft, was next round the lighthouse, with D. Donaldson-Stiff's Magister coming up behind. The Moth Minor, AFPN, did not appear to be doing quite as well as expected and was already behind the Magister, which had taken off simultaneously.

The old Leopard Moth, flown by Capt. J. H. Christie, was putting up a very good show (viewed against the handicap of its similarly-powered sister the Puss Moth, in last year's race, the Leopard's starting position should have stood it in good stead). A minute later the little Italian Rondone F.4 shot past extremely fast, most attractive in its smart cream coat.

Two tiny flea-like objects were quickly recognized as the Comper Swifts flown by R. Clear and D. Ogilvy. Ogilvy's pre-race intimation that he was "going upstairs" had certainly been adhered to, for he was considerably higher than any other competitor, but keeping well up with the other Swift.

F/O. Chandler's Magister appeared fast and low, but without a sign of Hayhow's Aiglet Trainer, AMOS. Although the machines had taken off together it was 11 sec before a flash of yellow and a racing number 27 heralded Hayhow, who, incidentally, had given 10 min 20 sec to the similarly-powered Autocar. Later he dropped out to shepherd Bennett's Proctor, which hit the water.

A startling sight was ten Proctors flying at varying speeds and heights, all making for one small lighthouse. However, nothing very spectacular developed; they all appeared to be holding their own and turned in at Newhaven in their starting order—with the exception of McIntosh in AHFA, who had already reduced the 45 sec start of the preceding Proctor, No. 77.

The Saab Safir, flown by Capt. Bissmark, then appeared, closely followed by G/C. Bader in Jean Batten's famous Gull Six. One more Proctor, No. 73 AHNA, then appeared on the horizon, having given 1 min 15 sec to the Gull Six, and nearly 2 min later the throaty roar of Jimmy Rush's Falcon Six was heard. Of the two Geminis, Dunkerley in AKKB had been given a 10 sec lead over Somers in AKDC, but had failed to keep it and was 2½ sec behind at Newhaven.

A long wait was eventually ended by the arrival of Ron Paine in DGP, who executed a steep turn round the lighthouse. The next five minutes passed painfully slowly until, in the distance, to the left of the tall chimneys, the Ambrosini S.7 approached, low over the waves. He had gained 21 sec on his handicap already. So with I-BOZI safely round the Newhaven Lighthouse we hurriedly made our way back to Brighton West Pier. On parking the car we were in time to see Ferrari's machine streaking past the finishing line; we just missed McIntosh.

The Ambrosini had completed the 160-odd mile course from Newhaven in less time than we had taken to walk back along the breakwater and motor the eight and a half miles to Brighton.

CHAMPIONSHIP POINTS

Name	Express	Total	Name	Express	Total
W. P. I. Fillingham	2	52	D. F. Ogilvy ...	2	33
C. Gregory ...	2	50	R. R. Paine ...	8	32
G. R. I. Parker ...	11	46	J. N. Somers ...	7	29
J. Rush	17	39	R. H. McIntosh	—	27
W. P. Bowles ...	—	37	F. Dunkerley ...	1	27
P. G. Lawrence ...	—	35	L. S. Loveridge	—	26
G. A. Farley ...	16	34	T. G. Knox ...	—	25
G. C. Marler ...	—	34	H. R. T. Chandler	5	25

The final race to be taken into account is the Siddeley Challenge Trophy at Coventry on August 23rd.

FROM ALL QUARTERS

A Churchillian Axe?

NEW measures to effect drastic economies in Royal Air Force manpower were foreshadowed by the Prime Minister in his speech to the Commons during the economic debate last week. His reference to such measures began with the comment that it would be necessary for all three fighting services to divide their objectives between the maintenance of existing forces and new and important equipment.

Dealing with the Air Force, he said that the pressure on new types was evident. The worst thing that had happened about aeroplanes since rearmament began was the failure to take steps to accelerate the arrival of the newest and finest types.

Mr. Churchill then said it would be necessary to reduce the maintenance charge in the existing Air Force by ceaseless economies in overheads. The best measure in this respect was the number of men required to keep a fighting aeroplane and its crew in the air. The war-time figure was 112; today it was 113. With the current expansion programme, it was planned to reduce it to 95.

He conceded that the new types coming into service would require many refinements in the field of maintenance and care. But, he said, the rule must be that every man on the strength of the Air Force must be judged by his contribution to our flying fighting strength. It might well be that the number of air personnel could be reduced without detriment by a system of what he had called in the past "immediate reserves." (Mr. Churchill here appeared to be drawing an analogy with the Royal Fleet Reserve).

The Transatlantic Helicopters

THE first helicopter transatlantic flight was successfully concluded at Prestwick Airport, Scotland, last Thursday, July 31st, when two U.S.A.F. Sikorsky H-19s (S.55s, 600 h.p. Pratt and Whitney R-1340 engines) touched down there after flying over 4,000 miles from Westover, Massachusetts, in 42 hr 45 min air time. That the overall time amounted to 16 days was due to the weather—and it is said that all but two of a series of delays through this cause arose from the fact that the escorting fixed-wing aircraft, and not the helicopters, were held up.

Three of the four crew-members were Korean war veterans who had between them flown 290 rescue sorties (the Atlantic crossing, incidentally, formed the major part of a delivery-flight of the two S.55s to "D" Flight of the 9th Air Rescue Unit at Wiesbaden). One aircraft was flown by Capt. Vincent H. McGovern, with Capt. Harry C. Jeffers as co-pilot; the other by 1st Lt. Harold W. Moore, with Capt. George D. Hambrick as his co-pilot.

Summarized briefly, the story of the flight was as follows *July 15th:* Westover to Presque Isle, Maine, 380 miles; weather delay. *July 17th:* Presque Isle to Goose Bay, Labrador, 570 miles. *July 18th-19th:* Bad weather over Greenland precluded escorts from starting on a 570-mile crossing with a difficult landing. *July 20th-26th:* Three attempts: (1) helicopters met head-winds half way and returned; (2) another Greenland "clamp"; (3) bad visibility and rainstorms after 80 minutes' flying—return ordered. *July 27th:* Crossing made, but escorts diverted by bad weather and helicopters forced to land on tiny island 42 miles short of their destination, Bluie West 1. *July 28th:* On to B.W. 1; further weather delays. *July 31st:* Take-off at 0600 hr B.S.T. for Prestwick, 920 miles, *via* the Hebrides; touch-down at 1610 hr L.T.

At Prestwick, the crews were met and congratulated by Gen. Griswold, commanding the 3rd Air Force in Great Britain; Mr. L. D. Lyman, president of United Aircraft (whose helicopter division operates the Sikorsky factory) and his colleague Mr. Muir; Mr. Martin Graham of Pratt and Whitney; Mr. J. Fearn and Mr. A. H. Williams, respectively director and commercial manager of Westland Aircraft, the Sikorsky licencees in this country; and Mr. Colin Cooper, Helicopter Association.

A detailed story of the crossing will appear in *Flight* next week.

Outstanding Ypenburg Display

SOME 50,000 Dutchmen gave the transatlantic helicopters a wonderful ovation when they arrived at Ypenburg, the Hague, on August 2nd at the opening instant of ILSY IV—the fourth in the annual series of international air displays organized by the Royal Dutch Flying Club. Interest was sustained throughout the 3½-hr programme by nearly 40 varied and spectacular events. Aerobatic demonstrations were given by—among others—Prince Cantacuzene, Gerben Sonderman, Louis Nottéghem, Ranald Porteous, and George Thornton; these pilots were flying, respectively, the Bücker Jungmeister, Fokker S-14 and S-11, Stampe SV-4, Auster Aiglet and D.H. Chipmunk.

Mass flights were made over the field by American, Canadian, Dutch and Belgian formations with B-50s, Invaders, Thunderjets, Meteors and Sabres (the highlight of the second day's programme was undoubtedly the supersonic "bang-bang" produced by an R.C.A.F. Sabre diving on the airfield). Among the jet aerobatics were superb performances by six Vampires from B.A.F.O. and the four F-84s of the renowned U.S.A.F. Skyblazers team (who were making their 257th and 258th demonstrations). A full report will be published next week.

Venice Exhibition

THE Royal Aero Club of Italy, in conjunction with the Aero Club of Venice, recently organized the second Venice international display of touring and training aircraft. A good selection of light aircraft were to be seen and a few were demonstrated in the air. Of particular interest was the Caproni F.5 Trento two-seat jet trainer—powered with a Turboméca Palas—and its impressive performance in the hands of the company's chief test pilot gave promise for its future as an *ab initio* jet trainer. Other machines present were the Danish KZ-VII, Beech Bonanza, Aero 45, Morane 700 (flown by Mme. Auriol), a Minicab, a Swiss-registered Auster Autocar, and the Piaggio 148 trainer.

Aerocontacts were the only British firm represented. They are also the agents for the Piaggio trainer and for the Turboméca Palas turbojet. The firm is rebuilding Tiger Moths (with new engines), and one of these was taken to Venice by Mr. B. J. Snook, assistant aircraft sales manager. Mr. H. F. Hughes, D.F.C., Aerocontacts' managing director, was also present at the exhibition.

Coincident with the Venice affair was the international rally and tour of Italy—all part of the Italian Air Week. Some 25 entrants competed in navigation, endurance, landing, and speed tests, the finale being a ten-lap race which was won by a Belgian-registered Piper Pacer. Fourth place was taken by W/C. C. M. M. Crece (not Grace, as stated in last week's table of *Daily Express* Race entries), flying a Nighthawk.

Bristol's Australian Associates

FOLLOWING the association of Aeronautical Supply Co. Pty. Ltd., with the Bristol Aeroplane Co., Ltd., the undermentioned (reports an Australian source) have been appointed to the former company's board: Mr. W. R. Verdon Smith, Bristol joint managing director; Mr. G. H. Tucker, general manager of Bristol Aeroplane Co. of Australia, Ltd.; Mr. G. A. Davis, assistant managing director of Overseas Corporation, Ltd.; and Mr. Clive Wallace Smith, a director of Overseas Corporation. Mr. W. F. Mullen, former general manager of Aeronautical Supply, is an associate director, and Mr. J. W. Nolan business manager.

ACHIEVEMENT: The two Sikorsky H-19s (see "Transatlantic Helicopters," above) approach Prestwick at the end of their historic flight. Right: Gen. Griswold, commanding 3rd U.S.A.F., congratulates the crews (left to right): Capt. McGovern, 1st Lt. Moore, Capt. Jeffers and Capt. Hambrick.

HERE AND THERE

Germans for Farnborough

AMONG German aircraft designers who will attend the S.B.A.C. Display in September are Professor Ernst Heinkel, Professor Claudius Dornier, and Dr. Fritz Siebel. Dr. Dornier has been working in Madrid for two years and is reported to advocate a "European pool" in aircraft construction for mutual defence.

B-36 Orders

THE U.S.A.F. has announced that, when existing orders for the Consolidated-Vultee B-36 "global" bomber are completed in 1954, no more of these machines will be acquired. This decision, indeed, is hardly surprising in view of the age of the B-36 design and the successful flight-testing of the jet-propelled YB-60 and YB-52.

Migs v. Fireflies

A NUMBER of Mig-15s recently flew some 200 miles from their Manchurian bases to attack four Fireflies and four Sea Furies of H.M.S. *Ocean* which were bombing supply and troop concentrations south and west of Chinnampho, the port which serves the North Korean capital of Pyongyang. Three Fireflies were damaged, but no crew members were lost. Of the three machines, one came down in the Yellow Sea, one force-landed, and a third returned to the carrier.

"Flight" photograph

HORSE FERRY: A York of Lancashire Aircraft Corporation (now to be known as Skyways of London) made several journeys to Helsinki with riders and horses of the British Olympic teams. Seen here at Blackbushe are Mr. Eric Rylands, L.A.C.'s managing director, with his hand on the arm of Col. Llewellyn, whose "Foxhunter" is the horse on the left; the next animal (partly concealing its owner) is Mr. M. M. White's "Nizefela," and the third is "Atherlow," owned by Col. D. M. Stewart (holding hat). In a sports jacket is Col. Talbot-Ponsonby, and on the right is the head groom.

Ground Gunnery Trainer

THE new T-13 "flexible gunnery trainer," developed for the U.S.A.F. by the Glenn L. Martin Company, is now ready for delivery. Utilizing the same fire-control equipment found in such bombers as the B-36 and B-50, it combines the measuring and scoring devices which continuously summarize tracking, sighting and gun-laying errors; as many as a dozen different kinds of error can be measured simultaneously. Instead of using film, a projector casts the shadow of a scale-model fighter.

AT THE SOURCE: A party of Indian, Pakistan and Malayan A.T.C. cadets who are touring this country visited the Auster Aircraft works at Rearsby on July 21st, accompanied by officers of No. 1 (F) City of Leicester Sqn. A.T.C. and by S/L. V. G. Hogan, D.F.C., of R.A.F. Station, Uxbridge. The party is seen here with Mr. R. L. Porteous, Auster's chief test pilot, after he had given an aerobatic demonstration—much appreciated by the visitors—of the Auster Aiglet Trainer.

Royal Log

A PAGE from the log book of Prince Bernhard of the Netherlands, reproduced in our American contemporary *Flying*, shows that His Royal Highness has flown a Hind, Hurricane 1, 2 and 12, Master 1, 2 and 3, Gladiator, Tutor, Spitfire 1, 2, 5, 9 and 14, Mosquito 9, Gauntlet, Mitchell, Liberator, Mustang, Lancaster, Thunderbolt, Firefly, Mallard, Meteor 7, Sea Fury, Scandia, Vampire and Lockheed T-33, in addition to a string of lower-powered machines.

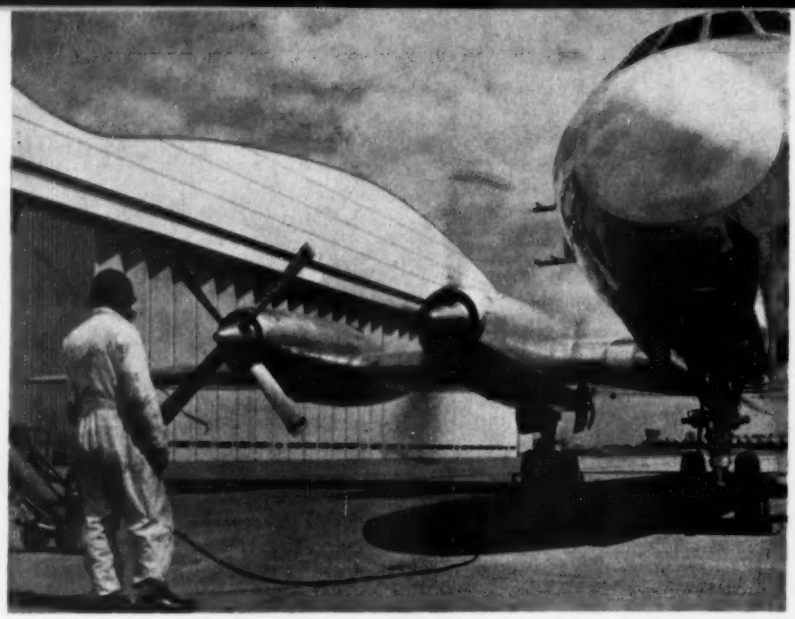
Unusual Accident

PILOT and flight engineer of a PanAm aircraft have been suspended following the death of a woman passenger after the cabin door blew open at 15,000ft during a flight between Rio de Janeiro and Montevideo. The passenger is said to have been "sucked" out of her seat just forward of the door. Trunk services on this route are normally flown with Stratocruisers.

Washington Apparitions

THREE times last week radar observers at Washington National Airport, U.S.A., obtained unidentified blips on their screens for which they could obtain no immediate explanation. So many strange phenomena have been reported over the American continent in recent months that we hesitate to comment; but a genuine trace on a radar screen certainly takes some explanation, if tangible aircraft are ruled out. Explanations so far advanced include: tin-foil "Window" dropped from high-flying B-36s; stray meteorological balloons; and, as a kind of last resort, an unexplained atmospheric condition, capable of reflecting radar waves. The last set of blips were measured at a ground speed of 110 m.p.h. between 1.30 and 6 a.m. on July 29th, between Andrews Air Force Base, Maryland, and Herndon, across the Potomac in Virginia.

HERE AND THERE . . .



OUT IN THE SUN: The day when Bristol's first Britannia makes its initial flight is eagerly awaited and, as this welcome scene indicates, cannot now be far distant. In the photograph, taken in front of the "Brabazon hangar"—from which it emerged on Monday, July 25th—the new airliner is seen for the first time freed of its encumbering scaffolding and able to display its majestic grace to the full as the Proteus turboprops are given their preliminary ground-runs.

London Airport Noise

ANOTHER deputation from residents living in the neighbourhood of London Airport has made representations about aircraft noise in that area. Receiving them last week, Mr. Maudling, Parliamentary Secretary to the M.C.A., told their leader, Mr. R. R. Harris, M.P., that "determined efforts were being made to limit the noise." He hoped the erection of the first acoustic wall would begin shortly. There was little prospect of a satisfactory aircraft-silencer being developed in the near future.

To the Lords by Rotorplane

ON Thursday of last week the South Bank helicopter trials (see pages 160-161) were enlivened by the arrival of "the first peer to fly to a House of Lords debate by helicopter." He was Lord Douglas of Kirtleside, chairman of B.E.A., and he had allowed himself two minutes to walk from his office at Northolt to the Bristol 171 (piloted by Capt. Jock Cameron), ten minutes—take-off to touch-down—from Northolt to the South Bank, two minutes for rotor run-down, and two minutes by car to Westminster. But he had fifteen minutes' chat with journalists, during which he said, "I think we shall have really big helicopters coming into London in five to ten years." Lord Douglas was accompanied on the flight by Sir John Keeling, B.E.A. deputy chairman, and Dr. G. Hislop, i/c the B. E. A. helicopter-development programme.

Another Honour for Capt. Taylor

IN addition to the Johnson Memorial Trophy of the G.A.P.A.N., Capt. P. G. Taylor has received the Oswald Watt Medal of the Aero Club Federation of Australia. Like the G.A.P.A.N. award, it is in recognition of his Pacific survey flights and other services to civil aviation.

Hayhow Records Confirmed

NOW confirmed by the F.A.I., the flights made by T. W. Hayhow to Copenhagen and Berne in his Auster Aiglet G-AMOS on May 30th and June 7th stand as international light-aircraft records. The confirmed speeds read as: London-Copenhagen, 190.087 km/hr (118.3 m.p.h.); London-Copenhagen-London, 166.297 km/hr (103.5 m.p.h.); London-Berne, 227.094 km/hr (141.3 m.p.h.); Berne-London, 178.667 km/hr (111.1 m.p.h.); and London-Berne-London, 188.321 km/hr (117.2 m.p.h.). These records supplement those which Hayhow obtained at Easter, which were confirmed on June 8th.

Gatwick in the News

A FORECAST in *Flight* as long ago as January 1950—"Gatwick, a Possible Diversionary Airport for London"—may soon be confirmed: Mr. Lennox-Boyd, Minister of Civil Aviation, said in a Parliamentary written reply last week that it had been decided to develop the airport as a southern alternative to London Airport, and as a base for some scheduled services and other air-transport activities. Detailed plans for its development would be discussed with local authorities in the near future.

IN BRIEF

IT has been announced that Mr. F. H. K. Henrion, M.B.E., F.S.I.A., has been appointed consultant designer to Pest Control, Ltd. He will be responsible for "styling" all their aircraft, road vehicles and spraying machines.

* * *

Some 360 applications for membership of the Institute of Materials Handling—formed last April—have already been received. Chairman of the council is Mr. H. P. Mott of Vauxhall Motors; the offices are at 20/21 Took's Court, Cursitor Street, London E.C.4.

* * *

A 20-guinea 1952 students' essay prize of the Institute of Metals has been awarded to Mr. John C. Wright, a laboratory assistant in the Mond Nickel Company's research department, for a paper on *Metallographic Investigation of Failed High-temperature Components*. Details of the 1953 competition have also been issued by the Institute, whose H.Q. are at 4 Grosvenor Gardens, London S.W.1.

Mr. William E. Miller, M.A.(Cantab.), M.Brit.I.R.E., has been unanimously nominated president-elect of the British Institution of Radio Engineers for 1952-53.

* * *

At the recent annual general meeting of the British Standards Institution, Mr. John Ryan, C.B.E., M.C., was elected chairman, in succession to Sir Roger Duncalfe. Viscount Waverley, P.C., G.C.B., G.C.S.I., G.C.I.E., F.R.S., was re-elected president and Sir Roger Duncalfe elected vice-president. Mr. Ryan is president of the Metal Box Co., Ltd.

* * *

In the caption to a photograph published on page 88 of the issue of July 25th, the Plessey director seen in conversation with A. V-M. Dalton-Morris should have been named as Mr. E. J. Earnshaw. Mr. B. G. W. Attwood was the chairman at the dinner, at which Plessey International, Ltd., entertained delegates to the British Commonwealth Signals Officers' Conference.

Mr. A. G. H. Pritchett has been appointed general sales manager of Chamberlain Industries, Ltd., Leyton, London E.10. He has as his deputy Mr. D. S. Jordon, A.S.M.A.

* * *

Whitehouse Industries, Ltd., have now opened their new Midland office—under the direction of their Midlands sales manager, Mr. Howard R. Davies—at 19 Eaton Road, Coventry (Coventry 62447).

* * *

From Repton Engineering Co., Ltd., Albion Street, Birmingham 1, comes a catalogue (No. 4/652) of the wide range of repetition turned parts, rolled-thread works, etc., which they produce.

* * *

Mr. A. Robert Jenkins, J.P., A.I.Mech.E., deputy managing director of Robert Jenkins and Co., Ltd., of Rotherham, was installed as president of the Institute of Welding at the recent annual general meeting.

What about CANADAIR'S MANPOWER

Vignettes of
CANADA — AIR LAND
Rather than wait for the spring break-up that would make navigation by water possible, the biggest airlift ever to operate over Canada's northland was recently organized.
The operation, extending about 700 miles over Canada's most rugged country, involved the air freighting of thousands of tons of bulky mining equipment to the Eldorado uranium mine on Bear Lake, and brought into service more planes than have ever flown on a supply mission in the north.
Today, Canada's leaders of industry no longer wait for such details as winter break-ups. As an air-minded nation Canada sees the air in the speedy development of her untapped natural resources.

The steady, reliable Canadian 'manpower pool' is without question one of the key factors in Canadair's ability to produce planes.

Canadair is fortunate in being located in an area abundant in skilled workmen . . . workmen who are strongly rooted in their traditions of home and province . . . intelligent, conscientious craftsmen . . . typical of the thousands who man the Canadair assembly lines *today* — and who will be on the job *tomorrow*.

Canadair has gained global recognition through its workers . . . through the honouring of delivery dates . . . through the building of aircraft rendering the maximum of service.

For further information: European Representative, J. H. Davis, Princes House, 190 Piccadilly, London, W1, England.

Canadair

LIMITED, MONTREAL, CANADA

CAS2-1SURT

MARCONI

offers appointments to

DEVELOPMENT ENGINEERS

PROJECT ENGINEERS

TECHNICAL SALES ENGINEERS

It is a tradition for Marconi's Wireless Telegraph Company Limited, with their unique reputation, to point the way in all branches of avionic research and development.

Today the Company has vacancies for suitably qualified engineers who have experience of airborne and ground based H.F., V.H.F. or U.H.F. communication equipment or navigational aids.

Attractive careers await such men who wish to become: DEVELOPMENT ENGINEERS; PROJECT ENGINEERS; TECHNICAL SALES ENGINEERS.

You are invited to write, giving full personal details and quoting the reference S.A.20. to:—

Central Personnel Services

MARCONI'S WIRELESS TELEGRAPH COMPANY LTD.

24-30 Gillingham Street, London, S.W.1

Your application will, of course, be treated in strict confidence.

BATTLING BANTAMS

Light Aircraft for Hit-and-run Attack: A New and Promising Line of Development

Prototype of the Temco T. 35, armed with ten 2.75 in rocket projectiles and two 0.30 in machine guns. Note the "pillar box" slots.

AIR FIGHTING in Korea has been so one-sided that few lessons have been learned that would be of importance in a new global war. Occasional long-range brushes with short-ranging Mig-15s have proved the value of sound pilot-training and first-class gun-sights. But absence of more intense air opposition, the fortunate non-appearance of enemy submarines and the fact that United Nations Air Forces are not allowed to attack Communist bases over the Yalu River have given a false overall impression of the possibilities and impossibilities of modern land and carrier-based air power.

One of the few clear lessons to emerge from the war is the value of light aircraft for ground attack. The idea is not new. Luftwaffe ace Hans Ulrich Rudel has described in his book *Stuka Pilot* how the Russians used their little wire-braced U-2 biplanes for "mosquito" raids at night :—

> "Whenever the 'wire cranes' observe a light they drop their small shrapnel bombs. They do this everywhere, even in the front line. Often they shut off their engines and go into a glide; then all we can hear is wind humming through their wires. The tiny bombs drop out of this silence and immediately their engines begin to purr again."

These sorties were less a method of serious attack than an attempt to fray the nerves of a retreating enemy, and the outstanding ground-attack aircraft of World War II was the powerful, aggressive Typhoon rocket-armed fighter. In fact, when jets began to supersede piston-engined fighters in the Royal Air Force, there were many people who admitted they would feel happier if we still had a few hundred "Rocket Tiffies" up our sleeve, in case jets proved useless for ground attack.

Fortunately, in Korea, Shooting Stars, Thunderjets, Panthers and Meteors have proved their efficiency in this role. But high fuel consumption allows jet pilots little time to look for ground targets; high speed adds to the difficulty; surprise attack is almost impossible to achieve; and it is, anyway, an expensive way to deliver half a ton of bombs or rockets. So, to ease the burden on pilots of American ground-attack types, the U.S. Far Eastern Air Force quickly decided to form a "mosquito" squadron of sturdy, dependable, fairly fast spotting aircraft, to search out and mark targets for the fighters. That, briefly, is how the North American T-6—our old friend the Harvard—finally went to war.

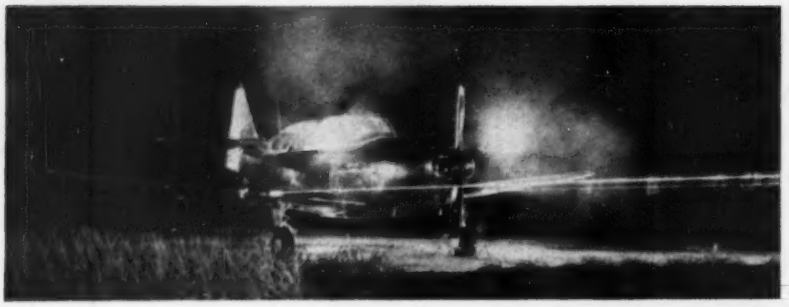
The squadron flew into action for the first time on July 10th 1950, and soon proved its usefulness. Air Force and Naval fighter pilots, guided by the T-6s, were able to find their targets more often, and their attacks were more decisive. Moreover, despite their low speed, the "mosquitoes" suffered casualties comparatively light—ten aircraft damaged and/or destroyed in the first two months, without the loss of a single pilot.

Nevertheless, the crews of the T-6s quite understandably began to seek ways of playing a more aggressive part in the ground battle. Their chance came when they were given small white phosphorous rockets with which to mark targets more clearly for the fighters. Lt. Bruce Iverson set the ball rolling in November 1950, when he "marked" a Communist self-propelled artillery piece so effectively that he had to find something else for the fighters to attack.

Other, similar incidents soon followed, and both the U.S.A.F. and U.S. Navy began to consider seriously the possibility of developing a light ground-straffer. But the Service that really began to sit up and take notice was the U.S. Army. When the U.S. Services were "unified" after world War II, the Army had been forced to agree that the Air Force alone should have the right to buy and fly aircraft over 2,500 lb empty weight, and all armed aircraft regardless of weight. This limited the Army to light helicopters and "Cub" liaison aircraft like the little Aeronca L-16, Navion L-17, Cessna L-19 and Piper L-21—in other words, the types most suited to the job of "mosquito" ground attack.

Army mechanics at liaison bases in Italy had anticipated this development in 1944, when they clipped Bazooka rockets to the wing-struts of a few Cubs and Sentinels to

Below, the Fletcher FD-25 "baby bomber," of 2,500 lb gross weight, is seen in flight. The second picture shows U.S. officers with a phosphorous marker-rocket. With a similar missile, launched from their T-6 (Harvard), in Korea they destroyed a self-propelled gun.



The Temco T-35 during static night-firing tests of its two "thirty calibre" wing-mounted guns.

BATTLING BANTAMS . . .

see if they would work. They did; being recoil-less, the rockets imposed no great strain on the light airframes, yet packed a powerful enough punch to knock out a tank. But the Army was not allowed to operate armed aircraft, so the scheme went no farther.

When the same idea was tried out "unofficially" at Fort Sill, Oklahoma, last year, however, with a Sentinel carrying 0.30in. machine-guns and 100 lb bombs, senior officers were more inclined to turn a blind eye to rules and regulations, and the result may prove interesting.

Several U.S. light aircraft manufacturers have, in fact, already put up schemes to "re-vamp" their products to carry guns, bombs, rockets and napalm tanks. Most interesting to date are the Temco T-35 Buckaroo and the Fletcher FD-25 Defender.

The little all-metal Buckaroo (wing span only 29ft 2in) was developed originally as a tandem-seat trainer version of the well-known Temco Swift, with a 165 h.p. Franklin engine. Then the Israeli Government asked if their first production machine could be fitted with two 0.30in guns for weapon training. Temco not only did this, but mounted the guns on the torsional axis of the wing to provide fighter accuracy, and also found room for 100 rounds of ammunition per gun, an electric gun-sight and a 16 mm camera. The Israelis next asked if the Buckaroo could be fitted with rockets, and so it acquired ten 2.75in rockets in addition to its guns. The installation had little effect on performance, and the rockets were arranged to fire either in pairs or salvo. The Buckaroo thus became a ready-made attack type.

As a target marker, it could make use of the lower end of its wide speed range, down to 58 m.p.h., to spot the target, then make a second pass at its maximum dive speed of 218 m.p.h. to fire its marker rockets. The combination of small size and high speed would make it far less vulnerable to ground fire than the existing T-6s.

The Fletcher Defender was developed from the start as a light ground-attack fighter, embodying every feature that U.S. experts considered necessary for the job. Few details of its equipment or performance have been released, but photographs show it to be a sturdy aircraft of simple, all-metal construction, with wings that promise a wide speed range. Up to 40 small rockets can be carried under its wings in clusters of five, or a combination of standard 5in rockets, fragmentation and H.E. bombs or napalm tanks. Fletchers proudly claim that it introduces a new concept in fighter aircraft, carrying the punch of a heavy tank at one-twentieth the cost of such a vehicle, and this proving that they are well aware of its potential attractiveness to the U.S. Army as well as to the flying Services.

The Defender represents the peak of light ground-attack aircraft development to date, and its versatility in attack and low initial and operating costs may well lead to startling new ideas in air warfare. On the other hand, in a full-scale war it might prove vulnerable to ground fire and fighter attack, although World War II experience with slow-flying, manœuvrable A.P.O. aircraft tends to discount this possibility. In any case, the Americans are not the only people interested in this class of aircraft: the French Henri Potez company is developing a new aircraft designated Potez 75, powered by an engine of the same make and carrying a crew of two, plus rockets, bombs or napalm. The bulletin announcing it emphasizes that not only will it be more suitable for army co-operation attack duties than high-speed, high-altitude jets, but that it will be easier to fly. Thus, pilots could be trained more quickly to take an active part in any future campaign, and would not need the same high standard of physique as jet pilots.

The French Fouga series of jet-powered trainers would also seem to meet admirably the requirements of light attack. Fouga are aware of this, as they proved at last year's Paris Aero Show, where they displayed the C.M.82R Lutin, a three-quarter scale model of a close-support fighter powered by two Turboméca Palas engines and armed with a formidable array of guns and rockets.

Whatever happens, even if the U.S.A.F. and R.A.F. decide they cannot afford squadrons of entirely new types like the Defender and Lutin, it might not be a bad idea to consider simple modifications to current A.O.P., liaison and basic-training aircraft so that they could be adapted at short notice to carry guns, rockets and bombs if the cold war suddenly became hot. It would not be the first time that David had stopped a Goliath. J.W.R.T.

MIG-15 FOR TWO: A SOVIET AIR FORCE JET TRAINER

Based on drawings prepared for the "Joint Services Recognition Journal," this sketch shows features of the two-seat trainer version of the Russian Mig-15 jet fighter. The redesigned cockpit enclosure appears to be the only superficial alteration of any consequence.

BRITANNIA PRE-FLIGHT TESTING

Ingenious Rigs in Use at Bristol

THOSE interested in the Britannia—and there are many such—must by now be well acquainted with the exceptional quality of Bristol's new turboprop transport. In nearly every way this remarkable aircraft promises to surpass its competitors, and particularly in the sheer excellence of the airframe engineering—though this is an aspect evident only to those able to examine the Britannia at first hand. A full description of the airframe is planned for our issue of August 22nd.

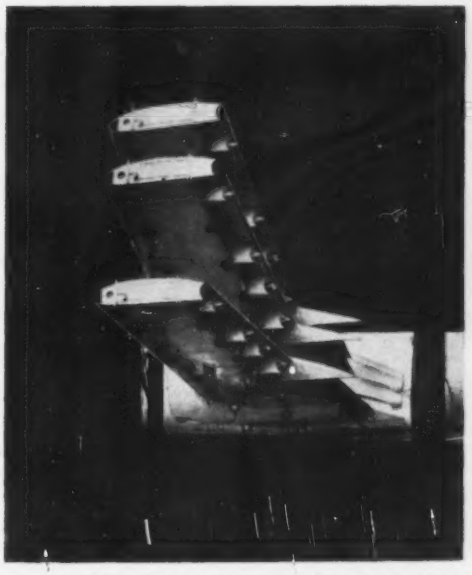
This excellence is not surprising: Bristol aircraft division (who have as much experience of metal structures as any in the business) have, in fact, undertaken an unusually complete programme of structural testing on the Britannia—a programme surpassing any other that the company has attempted, not excluding that required by the mighty Brabazon herself.

The remarkable non-flying prototype has already been fully described (*Flight*, March 7th, 1952). This full-scale mock-up (of the complete Britannia, less tail section, starboard outer wing and certain cowlings) has been used for a great number of ground actuation and flow tests and has certainly more than justified itself in releasing the first true prototype for full flight-testing probably weeks earlier than would otherwise have been possible.

This functional mock-up is still hard at work and is likely to remain so even after the "genuine article" has taken to the air. The nose and main undercarriages are faithfully reproduced and a lengthy programme of functional testing is in progress. Part of this schedule calls for an endurance run of 1,000 cycles to check the operation of cut-out valves, warning lights, pressure gauges, control valves and switches, and to gauge the wear on rubber rings and seals in jacks, accumulators and swivel joints. The emergency systems—electrically- and hand-operated pump units—are also brought into play at regular intervals and, after each lowering of the undercarriage, the hydraulic brakes are applied.

But structural testing for the Britannia has been an even greater task. Exhaustive investigation has been carried out on three major specimens: a complete wing; a half-scale rear fuselage mounted on stub wings; and a full-scale front fuselage. Possibly the most interesting examination was that carried out upon the complete wing, and it forms the subject of two excellent triple-exposure illustrations on this page.

In the design of the Britannia wing it was calculated that loads arising from either the gust case or landing case might prove critical, the former as regards most of the bending structure, the latter from the point of view of shear and torque in the inner wing.



The Britannia port wing (above) and starboard wing (at foot of page) undergoing the gust-case loading test. The three superimposed exposures for each illustration were made respectively at zero load, proof load (66.67 per cent), and 95 per cent of ultimate design-load. The maximum deflection at 95 per cent was seven feet. Without tips, the test specimen had a span of some 136ft.

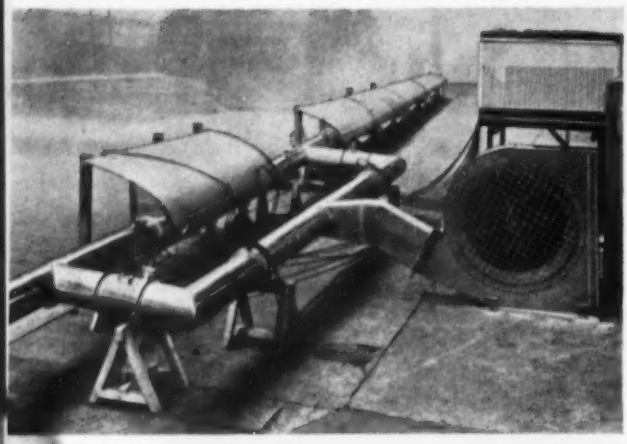
As only one specimen could be considered, it was decided that, firstly, it should be demonstrated that no appreciable permanent deflection resulted from application of the proof landing load (two-thirds of ultimate) and, secondly, that the wing could withstand 100 per cent of the fully factored ultimate gust case loads.

A complete wing was provided, less tips and control surfaces; leading and trailing edges were absent for the landing case, but were added outboard of the inner nacelles for the gust case. To provide correct wing-root conditions a 46ft length of centre fuselage was added. The company then investigated three types of test frame.

An "all-hydraulic" rig, in which loads were both applied and measured by one set of hydraulic jacks, was first considered. This was soon discarded because of the difficulty of providing jacks with sufficiently long stroke, the tip-deflection under the ultimate gust case being of the order of seven feet. An "all-mechanical" rig, in which loading and measurement was effected mechanically, was next tried; but this, too, was found impractical. Mechanical transmission of the loading was considered insufficiently accurate for heavy loads, especially since it was a requirement that all load and deflection indicators should be installed in a central control-room. Finally, a "mechanical-hydraulic" rig was evolved, the loading being applied mechanically and measured hydraulically. This was the type of rig found most suitable, and it was adopted.

The rig consists basically of a heavily reinforced concrete raft base-structure of shape and size suitable for likely wing plans of the present and future. Upon it are mounted six portal frames, whose locations can be varied to accommodate different types of wing. Each frame carries a mechanical straining unit consisting of an electric motor, four-speed gearbox and twin worm-driven straining screws, the whole being mounted on a horizontal pivoted beam. The floating

The starboard wing under test, as described in the heading caption above.



The cold-air test-rig for the wing leading-edge thermal anti-icing system. Flow manometers can be seen above the centrifugal blower on the right.

end of this beam rests on a hydraulic compression jack connected to a load-measuring dynamometer, and the lower ends of the straining screws are connected to the wing specimen *via* a conventional series of loading beams.

For the landing case, only the two innermost straining units were used, these being sufficient to apply the main undercarriage reactions, engine inertias, and an additional up-load at the rear spar; a separate hydraulic rig was used to impart undercarriage drag and side loads. During the test certain modifications became necessary to the fuselage and nacelle structure; when these had been effected, a satisfactory proof load and removal test was carried out, there being no appreciable permanent "set."

For the gust case, all six straining units were employed to apply lift-minus-inertia loads to the whole span; certain downloads were also imparted hydraulically to produce the correct torque, and the fuselage was pressurized to the working pressure of 8.3 lb/sq in to obtain correct spar frame conditions.

The specimen was tested to failure. It appeared perfectly satisfactory at 95 per cent of ultimate (see illustrations) but failed at 98 per cent. Bristol and R.A.E. personnel concluded that primary failure occurred in the starboard outer front spar; relatively small modifications there are expected to bring the wing strength to over 100 per cent.

Reference should also be made to the thermal anti-icing system, the operation of which has been tested in a leading edge test rig. The gas distribution will be finally tested in flight, but the equivalent flow-pattern for cold air has already been examined to assist adjustment of the flow regulators. A centrifugal pump was used to provide "ram air" to the chordwise corrugations within the leading edge, at the exits from which regulators are sited. These were first adjusted to give the correct distribution for the four-engined flight condition, and were later re-set to reproduce the three-engined condition with either an inner or outer engine inoperative. No material change in the flow pattern was noticeable.

FLUGFELAG'S FIRST FIFTEEN

SINCE Flugfelag Islands, the Iceland airline operators, started operations 15 years ago, they have carried more than 160,000 passengers—not a very impressive total, perhaps, until one realizes that it exceeds by 10,000 the entire population of Iceland. Even then, statistics tell only half the story. The true measure of the airline's value to the ordinary men and women of Iceland is that it has brought a quick, reliable, practical transport service to remote farming districts like Oeraefi, on the south-east coast, which is surrounded by rivers and high mountains, and entirely lacking in roads to connect it with the rest of the country. Flugfelag air-lift everything from potatoes to farm tractors, with the result that their freight services are now carrying over 1¼ million pounds weight of cargo a year. The farmers' gratitude is reflected in the fact that many of them have taken shares in the airline.

Flugfelag Islands was formed on June 3rd, 1937, but its first aircraft, a single-engined Waco seaplane with accommodation for four passengers, was not delivered until the following spring. Local services were started in May, 1938, the first linking Reykjavik with Akureyri, the chief town of northern Iceland. Two years later the fleet was doubled by purchase of another Waco with interchangeable wheel and float undercarriage, and in 1942 Flugfelag bought their first twin-engined machine—a Beechcraft. Today, they own ten aircraft, with a total seating capacity of 214 passengers.

About 770 passengers were carried in 1938. Five years later the figure was up to 2,073, but air-travel restrictions imposed by the occupation forces prevented any further rapid expansion. As soon as the European war was ended, however, Flugfelag began services with a Catalina between Reykjavik, the United Kingdom and Denmark—the first time that an Icelandic airliner had ever operated on international routes. These led in the spring of 1946 to weekly services between Reykjavik, Prestwick and Copenhagen (and later Oslo), at first with a DC-4 chartered from Scottish Aviation, and, from 1948, with Flugfelag's own well-known Skymaster *Gullfaxi*. To date, some 23,000 passengers have been carried over these international routes. In addition, Flugfelag operate internal services which link Reykjavik with 24 other towns and districts in Iceland.

Traffic results for 1951 showed a total of 26,443 passengers and 1,450,000 lb of freight carried on all routes—an increase of over 1,200 per cent in ten years, and a pretty impressive record for an airline with a payroll of only 120, including 16 pilots. J.T

(Below) "Gullfaxi" flying over the Westman Islands, which lie off the south coast of Iceland. (Right) supplies to and from the whole community are carried by the DC-3s and other aircraft of Flugfelag.

POLAR ROUTE

North-West Passage to make History again: Practical Stages for Commercial Flights

By EINAR PEDERSEN

WHEN Roald Amundsen forced his little ship *Ojoa* through the North-West Passage between 1903 and 1906, he won everlasting fame, but the opening of the passage caused no revolution in shipping routes. Later, in 1926, he flew the airship *Norge* from Spitzbergen to Teller in Alaska across the Polar Sea; this time the feat attracted less attention—but he proved that it was possible to link Europe and North America by a trans-polar air route.

Two years later Sir Hubert Wilkins proved that this route could be flown by aeroplanes; he took a Lockheed Vega some 2,200 miles from Point Barrow *via* Grant Land to Spitzbergen.

In 1937, however, the Russians took the lead in trans-polar flight when Chkalou surprised the world by flying direct from Moscow to the west coast of America *via* the North Pole. In July the same year the Russian Gromow broke the world record in long-range flying by going from Moscow to San Jacinto in California *via* the North Pole, 10,148 km (6,320 miles) in 63 hours. Both Chkalou and Gromow used a single-engined Ant-25 aircraft with a three-man crew.

A third Russian attempt, to fly from Moscow to Fairbanks, ended in disaster. Levanevsky and his crew disappeared with their four-engined aircraft some time after passing the North Pole. A series of search flights were made over the Arctic Ocean, and during the autumn and winter of 1937-38, Sir Hubert Wilkins crossed hitherto unexplored areas of the Polar Sea. These flights did not accomplish their primary object: Levanevsky and his crew were never found; on the other hand, Wilkins did discover that winter was the best time for Arctic flying. The weather is more stable than during the summer, and navigation is easier, because the stars may be used both by day and as well as by night.

Post-war Developments

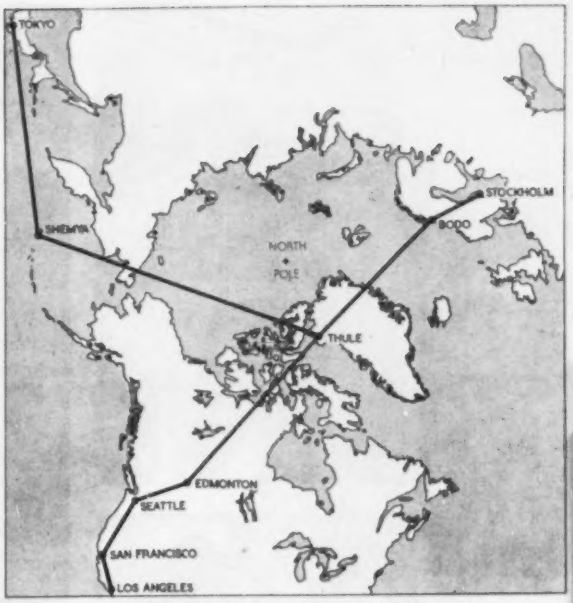
During the last war, when Russia came in on the Allied side, the idea of establishing a polar air-route was revived. But there were no tangible results, and when the war ended the Russians built their iron wall, thus cutting short all plans for friendly commercial flying across the Arctic.

At the end of the war the British became very interested in polar flying. The Arctic flights of the R.A.F. Lancaster *Aries* laid the foundations of modern polar air navigation. About this time the Americans became aware that they were lagging behind: thus they started the "Ptarmigan" flights from Fairbanks to the North Pole and back. After more than 500 meteorological flights to the North Pole, the U.S.A.F. are now the acknowledged leaders in the field of polar aerial navigation.

New instruments have been invented and new techniques developed. The Pfund sky-compass is one of the most important inventions in this field, for it enables the navigator to take course corrections from the sun when it is below the horizon, by means of the polarized light in the sky. The Greenwich Grid system and the gyro compass are, of course, the basis of polar navigation, for the magnetic compass is useless over great areas around the North Magnetic Pole.

Col. Balchen's non-stop flight from Fairbanks to Oslo in 1949 and Captain Blair's subsequent solo flight from Bardufoss in Northern Norway to Fairbanks showed that trans-polar flying now may be considered as incident-free as flying over the North Atlantic.

So far no commercial flying has been done on the trans-polar routes, primarily because the great distances between airfields have prevented existing airliners from carrying a useful payload.



This map shows the directness of the proposed trans-polar commercial routes from Scandinavia to Canada, the East Coast of North America, and the Far East. S.A.S. (Scandinavian Airlines System) have worked out plans for the route and proving flights may begin this year.

Very soon, however, the whole situation will change, when Thule airfield in Northern Greenland and Bodo airfield in Northern Norway will be ready for commercial operation, thus providing two excellent intermediate stops on the North-west passage to the West Coast of America and the Far East.

The Stockholm-Seattle route may now be achieved in practicable stage-lengths. Flight time at a cruising speed of 250 kt at 20,000ft, with a head-wind component of 20 kt, should be around 2 hr from Stockholm to Bodo, 6 hr 30 min from Bodo to Thule, 7 hr 35 min from Thule to Edmonton and 1 hr 55 min from Edmonton to Seattle. The total flight time should be 18 hr, which, compared with the conventional route from Stockholm to Seattle *via* New York, means a saving of 10 hr.

On the route to Tokio *via* the North-West Passage, assuming the same aircraft and wind-speeds, the flight times would be as follows :—

	hr	min
Stockholm to Bodo	2	00
Bodo to Thule	6	30
Thule to Anchorage	7	50
Anchorage to Shemya	5	45
Shemya to Tokio	8	10

The total flight time will be 30 hr 15 min. The flight time by the conventional route from Rome and Bangkok is around 40 hr. The 20 kt head-wind is in each case rather pessimistic and an even greater saving in flight time may well result. However, a 10-hr cut means much for both passengers and operators—for the passengers a lower fare, and for the company a higher aircraft-utilization.

It may take some time before scheduled airliners fly these routes; meanwhile, individual aircraft will continue the pioneering work. One day everyone will realize that the ancient navigators were not romancing when they dreamed about a short-cut to the East *via* the North-West.

(Above) A striking photograph secured as the Viscount flew over Kashmir. (Upper left) His Excellency the Governor of Malta, Lord Creasy, with Mr. A. D. McN. Boyd, Vickers-Armstrongs tour manager. Lord Creasy enjoyed a flight, with Lady Creasy and their daughter Juliet. For Mr. Boyd this call was a particularly interesting one, as he was a night fighter pilot based at Malta during the war. (Lower left) The Archbishop of Malta and the Acting Prime Minister sample the Viscount's comfort.

VISCOUNT'S DEMONSTRATIVE MONTH

Operators in Pakistan and India Sample Turboprop Travel

SINCE the article describing the Viscount's tropical and icing trials was printed in *Flight* last week, news of the successful completion of its subsequent sales and demonstration tour has been received. The crew, led by Mr. A. D. McN. Boyd, tour manager, comprised: Messrs. S. Sloan, captain; D. Jones, navigator/radio operator; J. Leach, design engineer; E. Walker, airframe inspector; C. H. Spooner, airframe inspector; S. Pickett, airframe engineer; J. Bray, electrical engineer; S. Jones, Rolls-Royce engineer; and Captain B. Wakely of British European Airways, who acted as second pilot.

The aircraft took off for India and Pakistan on June 21st and calls were made at Malta, Beirut, Bahrein and Karachi, where it landed on June 22nd. On the following day the Viscount continued to Delhi, where the demonstration programme started with flights before the D.G.C.A., the Indian Air Force and Indian National Airways, Ltd.

Next call-points were Madras and Hyderabad, where the aircraft was examined by Deccan Airways, Ltd., and Bangalore, on the last day of June, where Hindustan Aircraft, Ltd., had an opportunity of examining it before it went on to Bombay and Calcutta.

During the next ten days, Air India, Bharat Airways, Ltd., and Himalayan Aviation, Ltd., were given demonstrations and then the machine flew on from Calcutta to Delhi, and so back to Karachi. Here a second 50-hour inspection was carried out, and demonstrations were given to the R.P.A.F., to Orient Airways Ltd., and to representatives of the newly formed Pakistan International Airlines. At Delhi G/C. L. R. Stokes of the Rolls-Royce technical sales department joined the Viscount's complement for the flight home.

The return flight began on July 15th. Calls were made at Baghdad and Bahrein, and a demonstration was given to Iraqi Airways; at Beirut, Middle East Airlines inspected the Viscount before it continued on to Nicosia for the benefit of Cyprus Airways, Ltd., and to Ankara, to be seen by representatives of D.H.Y. (Turkish State Airlines). A final call was made at Malta, where Malta Airways in conjunction with B.E.A. had arranged further demonstration flights.

During one of these flights, over Sicily, at a height of about 15,000ft, the two Rolls-Royce Darts on the port side were cut to show the distinguished passengers (who included the Acting Lieutenant-Governor, the Flag Officer Malta, and the Ministers for Education, Immigration and Justice, in addition to those illustrated) the emergency capabilities of the aircraft. At a luncheon which followed the flight Colonel Strickland, chairman of Malta Airways, spoke of the possibilities of the Viscounts operating on the routes handled by the company. It was hoped, he said, that this might take place in the spring of 1953.

The Viscount finally landed back at Blackbushe on schedule on Friday, July 25th.

The RAF's new super-priority all weather fighter

Two Sapphire turbojets for unbeatable power

Britain's first operational delta-winged aircraft—"the best night fighter in the world"

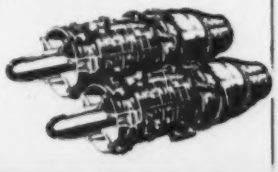
High mach number with proved docility at low speed

Capable of continuous development in many roles

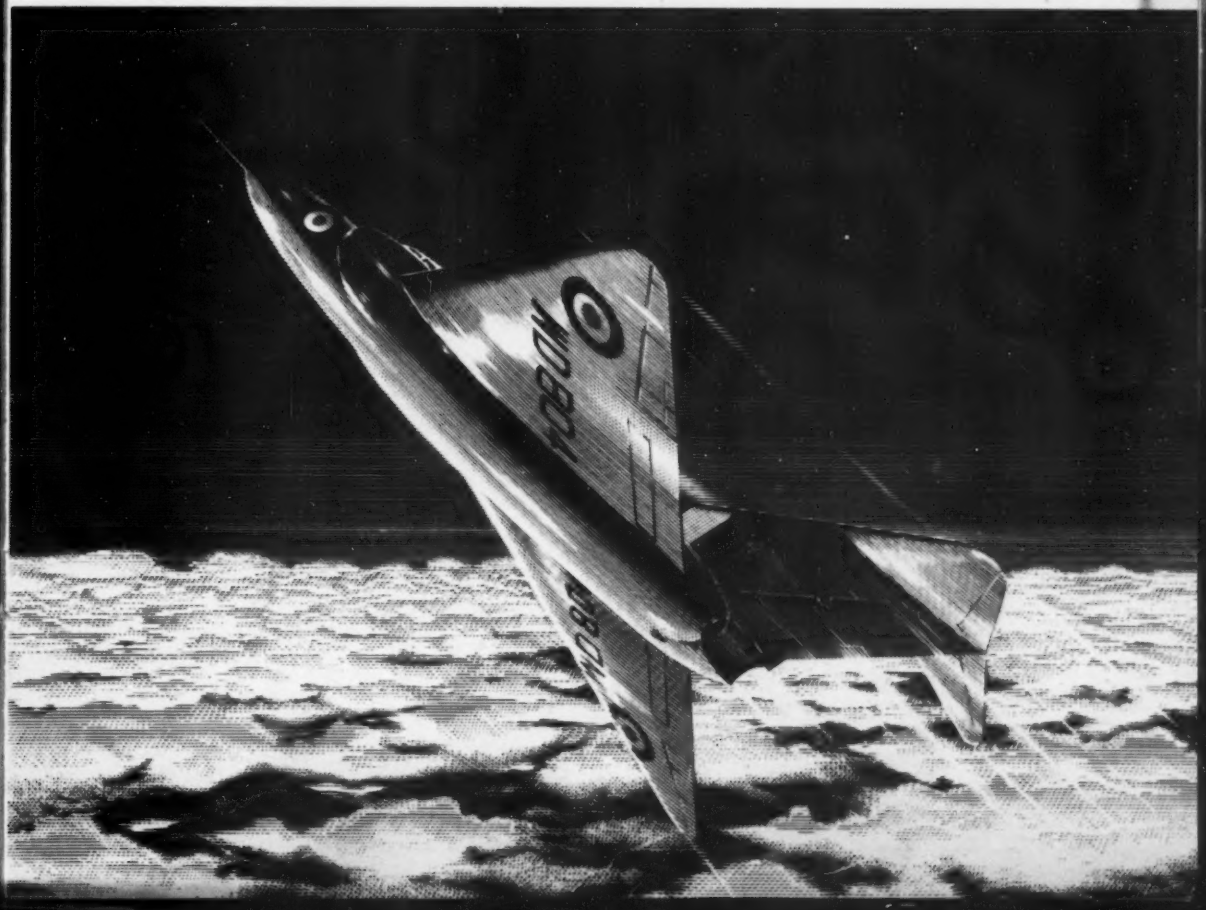
GA·5

GLOSTER AIRCRAFT

ENGINES BY ARMSTRONG SIDDELEY



A product of the Hawker Siddeley Group



More than 11,000 de Havilland propellers
are in operation in 70 countries
Basic repair facilities exist throughout
the free world

DE HAVILLAND PROPELLERS

DH
PROPELLERS

LOW-FLYING ACADEMY

The Training of Air O.P. and Liaison Pilots at Middle Wallop

Illustrated by "Flight" Photographs

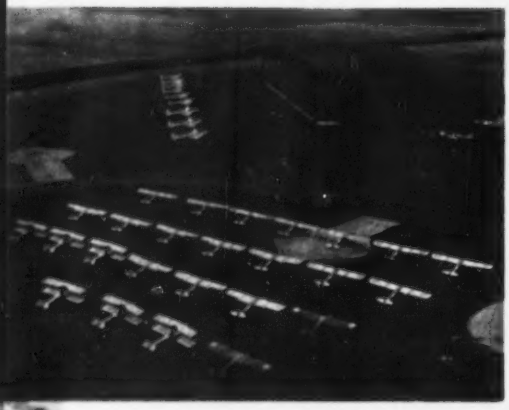
IN the normal run of Service (and, for that matter, civil) aviation, low flying is rightly discouraged. By contrast, in one highly specialized sphere of action—that of artillery spotting and liaison flying in battle zones—the pilot may have to depend upon it for his survival. He must be able to select, enter and leave the most rudimentary landing-grounds within shell-range of the enemy and without being detected visually or by radar; and he must be adept at evading enemy fighters by dodging nimbly among valleys, trees, and buildings. How Air O.P. and Liaison pilots are trained in these duties, and in the many others which their work entails, is related in this article—which, incidentally, also indicates a happy and smoothly working Army-R.A.F. partnership.

THE Royal Air Force Station at Middle Wallop is the home of the Air Observation Post Pilots' School, now re-named the Light Aircraft School. To visit it is a rewarding experience, and one which has convinced the writer that here the R.A.F. is discharging a duty which is probably unique among the countless tasks that it is called upon to perform throughout the world: and discharging it in the highest traditions of that Service.

Middle Wallop lies on Salisbury Plain, between its two sister-villages of Nether Wallop and Over Wallop—picturesque names reminiscent of Much Binding in the Marsh and other such fabulous stations. Commanded by G/C. G. A. L. Manton, Middle Wallop is one of the stations under the newly formed 81 Group, which is responsible to Fighter Command for all training within that Command. Divided into two separate, self-operating, units, the Control and Reporting School and the Light Aircraft School, the station provides an excellent example of the marrying of two entirely different types of flying. At the Light Aircraft School there are dozens of Tiger Moths and Austers doing everything that those well-tried and versatile aircraft will do, while at one and the same time Spitfires and Oxfords of the Control and Reporting School carry out their own duties. While the writer was there he also observed a couple of helicopters of No. 1906 Helicopter Flight, which is based on the station; and the fact that all this varied flying goes on every day without a hitch reflects great credit on the organization and on the air-traffic control officers and pilots who operate there.

To those of us who remember the happy days we spent in the early 'forties—the pleasant summer days sitting outside the crew room sunning ourselves whilst waiting our turn to fly—a visit to Middle Wallop brings an attack of nostalgia. For there one finds that old faithful, that aircraft which means more to many R.A.F. pilots than any other—the Tiger Moth. Nowhere else in the whole vast Flying Training Command of the Royal Air Force will one now find this aircraft. She has been replaced; and for some years since the end of the Second World War a more modern aircraft, equipped with two-way radio, beam approach aid, flaps and variable-pitch airscrew has been used to train the young

Before pilots graduate to highway landings and take-offs (as seen in the heading) they practise on marked-out areas of comparable dimensions on the runway. Note, in the upper picture, the radio van and the human wind-tee.



Some of the aircraft operated by various Middle Wallop units: Tiger Moths, Austers, Ansons, Spitfires.

Indoor instruction at Middle Wallop: Officers and N.C.O.s of the Royal Artillery and Glider Pilot Regiment at a radio lecture.

Some Royal Artillery and R.A.F. officers of the School's staff:—Back row, Capts. N. D. S. Grant-Dalton, B. Mattocks, K. F. T. Nightingale, C. Surgeon, G. H. Southall, K. W. C. Tucker, P. F. B. Cuppage, S/Sgt. R. W. Bowles. Front row: F/O. G. W. Coburn, F/O. V. R. Davis, Lt-Col. C. D. S. Kennedy (O.C. Flying), G/C. G. A. L. Manton (Station Commander), S/L. L. J. Madders, D.F.C., (C.F.L.), F/L. P. Clifford, F/L. G. R. Vince, F/L. R. H. Vere

LOW-FLYING ACADEMY . . .

pilots who belong to the new era—the jet era. The Percival Prentice has taken over the Tiger's job as a basic-training aircraft. But down at Middle Wallop the story is a different one—there the pupils are being trained, as the School's name suggests, to fly light aircraft; and so the Tiger Moth still holds her own. That is not to say that Chipmunks would not be welcomed—if only because they can be operated, as the R.A.F.V.R. have found, in weather unsuitable for Tigers.

The School is commanded by Lt-Col. C. D. S. Kennedy, who was kind enough to recall some of its history and objects. The Air Observation Post organization came into being at Larkhill early in 1940 and was officially known as "D" Flight. Their first operational assignment was to the Maginot Line in the May of that year, but the arrival of the Flight unfortunately coincided with the break through the Low Countries by the German army and this necessitated their withdrawal to the United Kingdom.

Amid much opposition at that critical time in our country's history, officers of the Air O.P. struggled on to gain strength and support. Among the pioneers were S/L. (now Lt-Col.) H. C. Bazeley, D.S.O., W/C. Davenport and G/C. (now Col.) E. D. Joyce; and it was the foresight and determination of these and other officers which led to the formation of the first flying unit to be under operational control of the Army since the formation of the Royal Flying Corps. Thus the energies and vision of that small band of Royal Engineers who successfully launched their first balloon in 1910 bore fruit some 30 years later.

It is interesting to note that, whilst the Army has always sought to have its own Air O.P., the R.A.F. has not denied it this privilege, and has helped in every way to train and support the growth of Air O.P. This is typified in the career of Lt-Col. Bazeley, who, after commanding "D" Flight, formed and commanded the first Air O.P. squadron, No. 651, which proved its value in the North African invasion in 1942. Soon after the end of the war Col. Bazeley commanded the School (then called 43 O.T.U., at Andover) and he retired when it moved to its present base. Joining the Territorial Army, he continued his association with this work and commanded No. 661 Auxiliary Air O.P. Squadron when this was raised at Kenley, finally relinquishing this post when he moved to a different area.

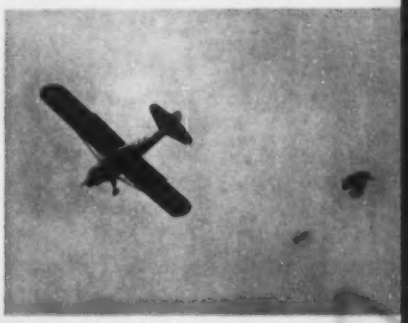
The Flight at Larkhill soon moved to Old Sarum, and, as the need for their work became more apparent, more and more artillery officers were selected for pilot training. Many of these students received their basic flying instruction in company with R.A.F. cadets at Cambridge, Peterborough, Woodley and Booker, and, upon successful completion of this training, moved to Old Sarum for operational training. In 1943 the unit moved once again—this time to Andover, where it was officially known as No. 43 Operational Training Unit and was later to become (after the war) No. 227 Operational Conversion Unit.

During this period a total of 12 Air O.P. Squadrons were formed and, in addition, the O.T.U. produced three Canadian Squadrons; but it was not until 1948 that a major step was taken in putting the Air O.P. School on an "all-through" basis. It was at this time that the school moved to its present home at Middle Wallop, and the whole of the Air O.P. and Light Liaison training now takes place at this station.

The School was formed to provide a flow of newly trained pilots for duties with the many squadrons now on service. A number of these units, such as those in Malaya and Korea, are overseas and in action. The Air O.P. pilot's duties are many and varied; but the chief of them, as his name implies, is artillery observation from the air. The student pilots are volunteers drawn from the Royal Regiment of Artillery. When the students qualify, their tour of duty with a squadron normally lasts for two years, after which the majority of them return to regimental duties. A proportion are selected after squadron experience for a course at Central Flying School, where they qualify as flying instructors and are posted to the

Ancient monument and elderly but still useful aircraft: A Middle Wallop Tiger flies low over Stonehenge, not far from the School.

Not all contact with ground forces can be maintained by radio, so the dropping of messages and light supplies is another duty that must be practised.



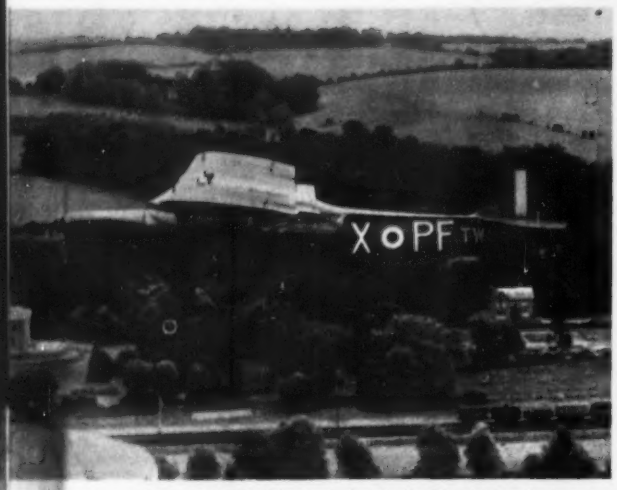
Light Aircraft School. Liaison pilots are selected from all ranks and from nearly all branches of the Army, and for over a year now the School has been training pilots for these specialized duties in addition to its artillery observation training. When qualified they transfer to the Glider Pilot Regiment as officers or sergeant pilots.

S/L. L. J. Madders, D.F.C., the school's Chief Flying Instructor, first introduced the writer to the Commander of the Elementary Flight, F/L. R. H. Burgess, and his team of R.A.F. flying instructors. After an introductory lecture by the Station Commander the new course arrives at Elementary Flight and is kitted out for the rigours of open-cockpit flying. After this has been completed the young Army pupil begins his training in earnest—training which will eventually lead him to those coveted Army wings.

These pupils may count themselves fortunate, for they are in the hands of very experienced pilots and instructors. Average time to first solo is approximately ten hours and during their stay with the flight they complete a total of 60 hours' flying. It is noticeable that even at this early stage the training emphasis differs slightly from that familiar to R.A.F. pilots, in that only two hours are devoted to aerobatics, but many more hours are given to precautionary landings, forced landings and low flying; and when one realizes that the light-aircraft pilot flying in battle zones in war relies on his low-flying skill for his survival it is easy to understand why so much importance is placed on such exercises. In war, pilots would be required to select, enter and leave landing grounds within shell-range of the enemy without being spotted by ground observers or radar. Evasion of enemy fighter attack, also, depends on flying among ground obstacles such as woods, buildings or valleys in such a way that high-speed fighters are not able to close for attack.

In high winds (upwards of 18 knots was quoted) it is not possible to operate Tiger Moths with safety, so in weather which would be otherwise suitable for basic instruction the Elementary Flight is grounded. As many of us know, prolonged periods of inactivity due to bad weather are a major problem at flying schools, and the R.A.F., by the introduction of the all-weather Prentice, has gone a long way towards reducing the flying-hour wastage to which we were accustomed during the war years. It would therefore seem that the school might improve its productivity with the introduction of a light aircraft suitably equipped with brakes, flaps and

The picturesque, thinly populated countryside of the Salisbury Plain area provides ideal territory for the kind of flying which the Middle Wallop pilots are required to learn, and the local farmers give friendly co-operation. This striking picture, by "Flight" photographer L. W. McLaren, must be one of the lowest air-to-air views ever taken: it was secured from a Tiger Moth flying in close company with the Air O.P. Auster.



Fine-weather "Bradshawing"—but the Air O.P. pilot must be an expert reader of maps as well as of station name-boards.

LOW-FLYING ACADEMY . . .

two-way radio. Such an aircraft would be most welcome as, in addition to the obvious advantages it would have over the Tiger Moth, it would enable the instructional staff to carry out the full scope of cloud, instrument and bad-weather flying, whereas at present it is difficult for them to fly the instrument hours required for renewal of their Instrument Rating tickets. Recently two Prentices were loaned to the school as an experiment, to see if two pupils given the same syllabus as those on Tiger Moths would show better results.

It is too early to know if basic training on a heavier-type aircraft will have any appreciable effect when they convert to the lighter Austers, but it was established that the all-weather Prentice can provide continuity of training. In view of the fact that the Army pilot is required to operate at low altitudes and from small strips and clearings, it would seem right that from the beginning of his training he should have "hopping from field to field" instilled in his mind; and even the most generous of us could hardly accept the Prentice as ideal for such flying.

Trout-spotter: Final idyllic glimpse of a Middle Wallop day.

After a short leave at the end of their course with Elementary Flight, the pupils return to the school to begin their intermediate training. Capt. R. J. Parker, M.C., the Flight Commander, described the pupils' work (during their stay for 70 flying hours in this flight) as one of conversion on to the Auster Mk 5s, 6s and 7s, and their introduction to all operational techniques. Here, too, is the first noticeable sign of specialization for future duties. Royal Artillery officers train as Air O.P. pilots, whilst officers, N.C.O.s and men selected from other regiments are seconded to the Glider Pilot Regiment for duties as Light Liaison pilots.

The Army instructors of Intermediate Flight are drawn from squadron pilots and come to the School after a course with the Central Flying School. The average time to first solo on the Austers is about two hours for day flying and some forty minutes at night. It is at this Flight that the pupils have their first taste of night flying as none is included in their syllabus at Elementary Flight. There are no electric flare-paths for the light-aircraft pilot : gooseneck flares are his only aid, and later (when he has advanced to Exercise Flight) he is trained to land by the headlights of a Service vehicle.

Three interesting features of the training by day are tactical low flying, and field and strip landings. For the opportunity to practice field landings the School is indebted to the co-operation of the local farmers, who keep between 20 and 30 small fields open to the Auster pilots; these fields are situated within a radius of 20 miles of base.

Extensive low flying is carried out and it is from now on that the student pilot who previously practised at normal heights is introduced to the techniques that are of utmost importance in war. Some 40 hours out of the pupils' allotted 70 are spent at heights below 500ft. "Strip landing" is the name given to an operational landing which has to be carried out on small areas such as clearings in woody country, and on roads. To simulate this the school employs a novel technique of marking strips in various places all over the airfield. These strips are 110 yd long and 5 yd wide, and the pupils are trained to take off and land on them in conditions up to a cross-wind strength of 15 kt from 90 deg.

A pupil is also taught how to look after his aircraft, and to camouflage it when grounded. Daily inspections and primary servicing are included in this part of his training, as are plug changes and small fabric repairs.

After a further week's leave the student pilot is ready to tackle the final stage of his training, in Exercise Flight. Commanded by Capt. N. D. S. Grant-Dalton, this Flight employs Army instructors once again, to supervise a programme which lasts six weeks. The aim of the training is to simulate the pilot's duties in war, and so the Air O.P. pupils concentrate on controlling artillery shoots some 15 of which they complete on the local ranges, while the liaison pupils practise their own special techniques such as supply-dropping into small clearings.

Movement exercises in which the pupils do all kinds of jobs, from flight commander to aircraft mechanic, support imaginary ground troops in a fast-moving battle. This may involve selection and occupation of some half-dozen new fields as airstrips in one day, over a distance of about 75 miles.

In addition to this are advanced low-flying exercises down to ground level, simulating concealment from enemy observation posts, or evasion of enemy fighters. Thus the emphasis which was first made in Elementary Flight, and enlarged upon in Intermediate Flight, is brought to the final stage in Exercise Flight—truly the Academy of Low Flying.

During the whole of the student's training, Ground School, in the experienced hands of Maj. H. W. Simms, D.F.C., R.A., teaches him the many subjects with which the light-aircraft pilot must be familiar before he is qualified. During the Elementary Flight stage lectures are very similar to those of R.A.F. pilot training, the subjects covered being Engines, Airmanship, Signals, Nav/Met and Principles of Flight. At the end of their first course with Elementary Flight, students sit for their Command Examination Board, and their ground training thereafter consists mainly of gunnery, photography, tactics, and army signals.

R.M.V.

The Percival P.56 "Provost" trainer with the Alvis Leonides Engine

ALVIS

LEONIDES

ALVIS LIMITED, COVENTRY, ENGLAND

The

Martin-Baker Patent

Ejection Seat designed for

high speed aircraft

Martin-Baker

AIRCRAFT COMPANY LIMITED

HIGHER DENHAM NEAR UXBRIDGE MIDDLESEX

TURBO-LINER

Development of the Allison T-38 Engine in a Convair 240

THE absence of firm American decision on the introduction of a turbine-powered transport serves to focus attention on the solitary aircraft in this category. The Turbo-liner, although hardly a "transport" in the true sense of the word, has been flying for over eighteen months. During this time many problems have been met, and overcome, by the Allison division of the General Motors Corporation, of Indianapolis. The history of this flying test-bed, and of the T-38 turboprop, has been related by D. J. Nolan, the assistant chief of installation engineering for Allison, in an S.A.E. paper, which is abstracted here. It provides an interesting insight into American engine development.

During the latter part of World War II, said Mr. Nolan, the Navy Bureau of Aeronautics issued a specification for an engine of such high power for the permitted weight and size, and such a low fuel consumption, that the Allison company considered a turboprop the only solution. To meet the specification they initiated development of a dual, high pressure-ratio engine, with either power section declutchable. As soon as bench tests showed this double engine—the model 500, or T-40—to be feasible, contracts were received from the Navy for design and development.

It was soon evident that time and money would be saved by hastening development of the power section as a separate unit; a suitable "single-unit" gearbox was therefore developed and the resulting engine, the Model 501, or T-38, completed a 50-hour flight-clearance test in September, 1949. At this time the engine consisted of a medium pressure-ratio 17-stage axial compressor, eight combustion cans, and a four-stage turbine, the whole giving some 2,750 e.h.p.

For flight testing, a Boeing B-17G was employed, suitably modified to receive the Allison T-38, complete with its oil system, in the nose. This test-bed completed 150 hours' ground running and 85 hours' turboprop flight operation; although lack of cabin pressurization militated against operation above 30,000ft, 13 flights were made up to 35,000ft, representing a total turboprop time at this height of 3¼ hr. The B-17 was used for windmilling air-starts up to 30,000ft, control work, blow-out tests, and measurement of power and specific fuel consumption. As a result, the airscrew controls were greatly simplified.

The Convair Acquired

In 1948 and 1949 it became apparent that Allison would be unable to obtain a modern military aircraft for T-40 development at the speeds and altitudes required, but eventually the original production Convair CV-240 was purchased in order to develop the T-38 single unit, two of these engines being installed by Convair. Undercarriage and exhaust considerations prohibited reduction of the nacelle frontal area, the only major airframe changes being the fitting of a light cargo floor and modification of the interior. Ground running started in November, 1950.

Vibration analysis showed airscrew stresses to be very low and flight clearance was quickly obtained; the first flight was made on December 29th. This flight was only of ten minutes' duration, a minor electric failure in the L.H. airscrew circuit having eliminated the electronic governing and necessitated a single-engined approach and landing. Inspection showed the cause to have been high-frequency vibration; at the same time fatigue cracks were found in the welded-steel structure joining the power section and gearbox. This assembly (see illustration above) was a legacy from the old B-17 nose-installation, the power section and gearbox both being rigidly bolted to heavy steel tubes, and the whole assembly being then suspended at three points by vibration dampers. Later engines were mounted on a different principle, shown in Fig. 2.

Thorough ground-testing was then undertaken; numerous vibration pick-ups and strain gauges were installed around

Fig. 1. The original Allison T-38 installation featured heavy steel tubes to which the gearbox was rigidly bolted. The drive shaft is housed in the horizontal tube entering the top of the gearbox.

the power plants and, as a result, high-frequency vibration was found on the gearbox at 1,400 to 1,700 cyc/sec. This was traced to the tooth contact rate of the main planetary gear and the amplitude of vibration on the L.H. box (more than twice that of the right) was assumed to explain the electrical failure. A new L.H. engine was fitted, which cured matters; the removed gearbox was then seen to have an undesirable machining configuration on the planetary gear teeth.

Shaking tests were next carried out, and these indicated a low-amplitude engine resonance coincident with airscrew speed. Although reduction of the amplitude by use of softer mounting inserts was seen not to affect the frequency, the amplitude was in no way objectionable. Bench testing lowered the 18.5 cyc/sec resonance frequency to 17 cyc/sec —considered close enough to identify the resonances as fundamentally similar—and the vibration mode-shapes showed slight bending of the engine. Concurrently, testing showed that maximum airscrew stress was experienced on the ground with a cross-wind; flight airscrew stress was nowhere found to equal half this value.

Initially, prototype engines only were available, built from spare components. A single-lever engine control was developed, the angular settings of which provided the following power conditions: 0 deg (i.e., levers fully down), full reverse thrust; 15 deg, zero thrust for starting; 30 deg, operational idle; and 90 deg (fully forward), full forward power. Fuel cut-off was effected by a switch.

Above the 30 deg position, the electronic airscrew governor took control; at the 30 deg point, a gate was inserted, actuated by a micro-switch on the undercarriage—to prevent selection of negative thrust in flight—while the reverse thrust blade angle was dependent solely upon power-lever setting. This arrangement was found to provide an efficiently controlled thrust variable between —5,000 lb and —2,500 lb; the only drawback appears to have been the fact that the taxying speed at the idling (30 deg) position was no less than 60 m.p.h.; this of course, necessitated liberal intermittent use of reverse thrust.

Flight testing was needed to establish a workable engine/airscrew combination capable of accepting the possibly high rotational acceleration of the power plants. Particularly in the overshoot case, there was found to be a need for a more rapid pitch-change, this being effected by increasing the airscrew hydraulic pressure from 3,000 to 4,000 lb/sq in. The final approach was made with the engines nearly starved of fuel; the resulting drop in r.p.m. caused reverse torque in the airscrew drives and helped to provide a drag of 2,000 lb, thus attempting to simulate piston engines and helping to reduce "float." Even so, the overshoot action was found to cause not more than 5 per cent overspeed during

the initial acceleration with the airscrew in super-coarse pitch.

Windmilling was a serious problem. Due to the high airscrew gear-ratio and the fact that the Allison T-38 was not a free-turbine engine, considerable windmilling drag was encountered; so much so that, pending the use of auto-feathering devices, single-engine flight with one engine windmilling and the other at maximum power was found to demand full aileron at 165 m.p.h. at 5,000ft, and full aileron and full rudder together at 155 m.p.h. In the latter case the rate of descent was found to be 900 ft/min.

Upon reducing the power from the live engine, stability and control were greatly improved; but, due to the low thrust, the rate of descent in this condition was found to be some 2,500 ft/min. The live engine could, however, be opened up again when the air speed had dropped to some 120 m.p.h., so reducing the descent-rate to some 400 ft/min without loss of control. All the same, automatic feathering was held to be essential.

To provide rapid feathering during power failure on take-off, without causing prohibitive drag and loss of control, a decoupling unit was inserted in the airscrew shaft. Spring tension was provided to allow for slight torque reversal—as might occur on windmilling starts—but take-off engine failure at once decoupled the airscrew; the shafts re-engaged when their speeds matched at about 10 per cent operating r.p.m. In addition to manual and automatic feathering through the normal electric system, an independent and over-riding pneumatic system was installed which, upon selection by the pilot, utilized the rotational momentum of the airscrew to produce feathering.

Scouring by Walnut-shell

At this point in his lecture, Mr. Nolan made the following statement: "One interesting and unique feature is the method by which the compressor blading, diffuser passages, etc., can be cleaned of foreign material. This cleansing method consists simply of dumping three to five gallons of ground walnut shells into the compressor inlet with the engine operating. The shells' abrasive action, while in no way detrimental to engine parts, effectively lifts off and purges the engine of unwanted foreign matter. A heavy black-brown smoke rolls out of the tailpipe while the shells are being poured in the inlet." [It is interesting to recall that B.O.A.C. were using ground apricot-stones, for de-carbonizing, as long ago as 1948.]

The Turbo-liner was flown across country on April 26th, 1951, from Lindberg Field to Edwards A.F.B., Muroc. Shortly afterwards a modified engine/airscrew control system was incorporated, designed to provide engine operation at constant speed (14,300 r.p.m.) in flight, and to remove from the fuel governor control of the "operational idle" fuel flow.

The starting system was the well-known AiResearch low-pressure pneumatic system. Self-contained, this layout employed a gas turbine/compressor running on aircraft fuel to provide compressed air at about 50 air h.p.; this was led

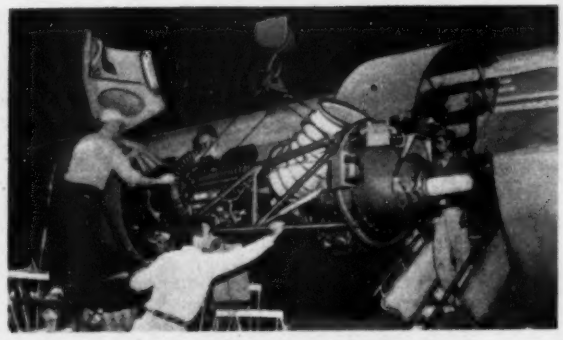


Fig. 2. The starboard engine in the modified form with a light tubular cradle accommodating both engine power section and gearbox. Note the air intake duct above the airscrew drive shaft.

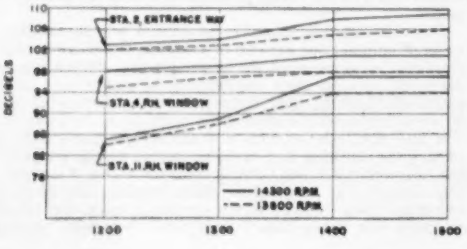
through 2¼in diameter ducts to air starters mounted on each engine gearbox. The gas turbine/compressor unit was itself started by an electric motor and was described as "small and compact, weighing about 200 lb installed." The starting sequence began with pressing the starter button for the AiResearch turbine; this cranked the gas turbine/compressor up to 12 per cent rated speed (some 7,200 r.p.m.), when fuel supply and ignition were effected automatically, accelerating the unit to the design speed of 60,000 r.p.m. in a few seconds. The pilot then selected the starter button for the desired engine, thus admitting air to the appropriate starter; the air starter motors delivered about 35 h.p. and were kept engaged with the turboprop above the critical speed of 2,800 r.p.m., and only disengaged at about 5,800 r.p.m., by which time the main power plant was capable of accelerating without external assistance.

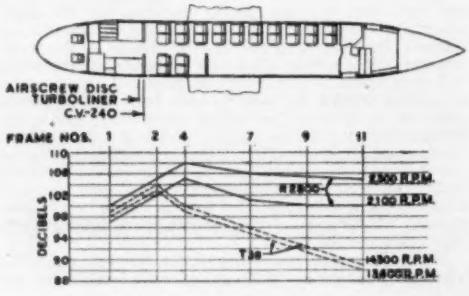
In September, 1951, it was considered that the electronic airscrew governing system had been perfected, but mechanical airscrew trouble persisted. High centrifugal twisting moments on the blades were found to be causing overloading of the pitch-change hydraulic system to a point where trouble was expected. But this was fairly easily cured by trimming away the blade roots—which were largely responsible for these twisting moments—to reduce maximum hydraulic pressure by 40 per cent for a loss of some 2 to 3 per cent in take-off thrust.

By mid-November, 1951, the Turbo-liner had been somewhat modified and was again ready for flight. The "fire-up" time of 2¾ minutes required by the original engines was considered excessive; a return was made to the original starting cycle in which excess fuel was supplied to the engine under control from the governor (as opposed to a constant-flow arrangement), which reduced the starting period to under one minute. The constant engine-speed in flight configuration was retained. The developed engines were equipped with electronic torquemeters between the power

Fig. 3 (below). A series of readings of cruising b.h.p. per engine plotted against noise level in decibels.

Fig. 4 (right). Noise level in flight at selected fuselage stations for the piston-engined Convair 240 (full lines) and Turbo-liner (dotted).





section and the gearbox; these were found to be both accurate and reliable.

A series of engine-performance measurements was then undertaken from sea level up to 25,000ft, with an added constant-power climb to 30,000ft. At 15,000ft the cruising speed was found to be nearly 30 m.p.h. greater than that of the original Convair-liner (i.e. about 310 m.p.h.); take-off ground run was measured as under 2,000ft and landing run, with reverse thrust, as even less; and the 1,500 gallons of fuel (petrol) then carried were estimated to allow a range of over 1,200 miles. Although the aircraft had not been flown on any fuel other than "standard gasolines," bench testing had been carried out with a wide range of petroleums, which promised reduced costs and greater utility. A synthetic, hydrocarbon-free lubricant was standardized, the chief advantages of which were low pour-point and the virtual elimination of sludge-formation.

The underlying cause of the characteristic noise of the Turbo-liner was the fact that the engines could only be run (whether on the ground or in the air) within the narrow speed range 92½ to 100 per cent of maximum r.p.m., together with the direct mechanical gearing to the airscrew with a ratio of 12.5:1. The airscrew—a 13½ft diameter, four-bladed Aeroproducts hollow-steel unit—was consequently maintained at a rotational speed varying only between 1,060 and 1,145 r.p.m., thus giving tip speeds of about 800 ft/sec. The resulting noise caused comment from ground crews, but, said Mr. Nolan, "they soon came to recognize the sound as part of a new group of sensations uniquely related to the turboprop engine."

While on the subject of noise, the lecturer commented upon audio phenomena possibly well known to British readers. Preparatory to taking off, the noise level—to a ground observer—was intense, but, as the aircraft accelerated, the noise decreased to such a degree that it was assumed that the pilot was reducing power. To examine this effect, observers stood at the upwind end of the runway and again noted that, as the aircraft approached, the noise rapidly decreased until, as the Turbo-liner passed overhead, it was no more than a "swoosh." Another discovery was the fact that, unlike the sound of the original Convair-liner (indeed, all piston-engined aircraft), that emanating from the Turbo-liner in flight could not be located in direction by ear only.

Decibel surveys were undertaken within the aircraft, some of the results of which are shown in Figs. 3 and 4. As expected, a maximum noise-intensity was encountered in the plane of the airscrew at full power. The Turbo-liner airscrew was farther forward than that of the Convair-liner, and it was also of greater diameter, resulting in higher noise values and more localized vibration. On the other hand, the essentially constant-speed nature of the T-38 engines made the isolation of airscrew noise and vibration a much easier task than had been expected.

At take-off power, a noise intensity of 108 to 112 db was experienced in both the pilot's compartment and the entrance way. It was interesting to note that, as power was increased at 14,300 r.p.m., corresponding to a rise in turbine inlet temperature from 1,150 to 1,300 deg F, the noise level was nowhere found to increase by more than 2 db (to 90 db), and was generally found to remain fairly constant. There was no noticeable rise in either noise or vibration at the rear of the cabin in the plane of the exhaust outlets. It was found difficult to isolate the physical sensations of vibration, particularly since, in the Turbo-liner, it was dependent upon blade passage-frequency against the fuselage. But amplitudes were, understandably, of a low order, and the passenger found it difficult to detect power changes in flight.

It was hoped that, if the aircraft were completely furnished, additional seats would absorb much of the noise; in its test configuration the interior was largely occupied by instrument panels and recording units, which may have been bad from the sound-absorption viewpoint.

In closing his paper, Mr. Nolan listed the problems which were still to be solved as: useful life expectancy; overhaul facilities and costs; pilot and crew education; air-traffic techniques; and optimum fuels and lubricants. The Turbo-liner would remain as an active project for demonstration and test for several years; it was, at the time of the lecture, engaged on fundamental research on the decoupling mechanism mentioned previously. As an aircraft it was not perfect, but in it Mr. Nolan saw "the gateway to tomorrow."

NEW BOOKS

Stability and Control

"The Principles of the Control and Stability of Aircraft," by Prof. W. J. Duncan. Cambridge University Press, Bentley House, Euston Road, London, N.W.1. Price 40s.

THAT there is so little bibliography on this all-important subject is a matter for great regret; and that this lamentable state of affairs is due to the fact that those capable of contributing to such bibliography are otherwise engaged we have no doubt. But here, at last, is a book eminently readable, up-to-date, excellently printed, and authoritative—a most satisfying publication. We are not, of course, forgetting the many books which have been published previously with similar titles—but this work of Professor Duncan's is of a much higher quality than anything on the subject that we have seen before. We have just one comment: has "angle of attack" really given way completely to the term "angle of incidence"?

Feed-back Analysed

"Automatic Feedback Control," by William R. Ahrendt and John F. Taplin. McGraw-Hill Publishing Co., Ltd., 95 *Farringdon Street, London, E.C.4. Price 64s.*

IN this work, the two authors—both men with extensive academic and practical experience—present a worthy attempt at covering a vast subject in a moderate-sized volume.

A thorough mathematical investigation into the fundamentals of various types of systems is undertaken, including the use of differential equations, complex numbers and the Laplace transform method for solving control problems, and also of the Fourier series and transform method for frequency analysis. This background is clearly established and presented, and the limitations or approximations of each method of attack are explained.

The authors do not fight shy of the discussion of non-linearity and discontinuity, despite the difficulty of mathematical analysis. The work closes with descriptions of fundamental types of feed-back control system. A.S.M.E. and A.I.E.E. nomenclature and symbolism are used throughout.

OTHER BOOKS RECEIVED

Physical Aspects of Air Photography, by G. C. Brock. Longmans, Green and Co., Ltd., 6 and 7 Clifford Street, London, W.1. Price 56s.

Aeronautical Engineering, Vol. 2, by R. Tatham. English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4. Price 21s.

The A.B.C. of Gliding, by Fox Green. George Allen and Unwin, Ltd., Ruskin House, 40 Museum Street, London, W.C.1. Price 12s. 6d.

Air Pilot Training (Fourth Edition), by Bert A. Shields. The *McGraw-Hill Book Co., Inc.*, 95 Farringdon Street, London, E.C.4. Price 64s.

Annual Report of the Smithsonian Institution (1950). Obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price $3.00 cloth.

R.Ae.S. EXAMINATION RESULTS

THE Royal Aeronautical Society announces the following names of those successful in the Associate Fellowship examination held in May last:—

Part I.—J. Allcroft, R. Ashford, D. R. Barham, T. S. Beddoes, R. M. Blunt, D. G. A. Bridgnell, D. R. Brodie, W. R. Bryce, S. G. Corpe, K. G. Draper, P. J. Farmer, D. J. Frater, R. A. Hacker, M. J. Harris, J. A. Jehin, I. H. Khan, R. Lewis, D. W. Pickston, N. R. Reddy, J. F. Richards, A. G. Rogers, J. Rye, B. Singh, S. Singh, D. H. Tipper.

Part I (Overseas).—D. S. Carton (Pakistan), R. B. Lal (India), F/L. W. Raj (India), R. S. Skulsky (Canada).

Part II.—A. D. Balmain, D. S. Bliss, H. A. Buchholdt, R. S. Dabbs, D. A. Drane, L. J. Geering, A. J. Heath, B. T. Lewis, E. Mowforth, G. A. C. Searle, P. C. G. Stalkartt, D. Wood, J. C. Young.

Part II (Overseas).—A. V. Ranga Rao (India), Cpl. T. W. Thomas (M.E.A.F.).

A satisfying sight for the makers, the Services, and all who see an important future for helicopters, is this formation of Dragonflies (Alvis Leonides engines) on their recent delivery flight from Westland's field at Yeovil to Gosport.

"Flight" photograph

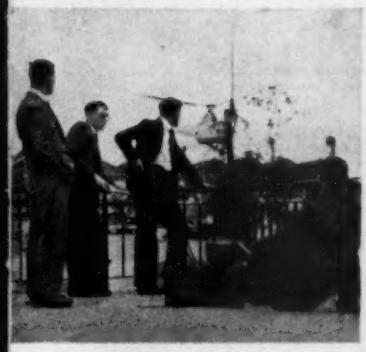
B.E.A. helicopter Captains J. G. Theilmann and Jock Cameron (in the Bristol 171), who were flying the helicopters when the accompanying photographs at the South Bank Site were taken. Seen with them is W/C. R. A. C. Brie, head of the B.E.A. Helicopter Unit.

MARCH OF THE ROTORPLANES

NO type of aircraft is to be found more widely dispersed around the world, or engaged on more diverse duties, than the helicopter. To date America has been by far the greatest producer of these rotorplane maids-of-all-work, and the output of the U.S. industry has been greatly stimulated by the military requirements in Korea. In this country, developments are at last beginning to receive more encouragement and are thus increasing in tempo. Some very promising designs are on the stocks.

On these two pages are to be seen some examples of the day-to-day activities of typical British and American helicopters. The trial landings which are now in progress at the South Bank site in London were referred to briefly last week. They are being carried out by the B.E.A. Helicopter Unit, and herald the introduction in about two years' time of regular passenger services into the city. On Wednesday of last week the Minister of Civil Aviation, Mr. Lennox-Boyd,

(Below) The very first landing on the South Bank Site was made on Monday, July 28th, by the Westland-Sikorsky S.51, G-AJOR. Waterloo Station may be seen in the background. (Right) On the second day of the trials the Bristol 171 G-ALSR was used for landing and noise-level experiments, and for some rather exciting trial approach procedures.



"Flight" photograph

Some of the experts concerned with communications, wind and sound measurement. The N.P.L. was called upon for the noise recordings, which were made at several points in the area.

During his recent tour of the aircraft industry in the West Country, the Minister of Supply, Mr. Duncan Sandys, visited Rotol, Ltd., at Gloucester, where he was met by Sir John Evetts, managing director and Mr. D. A. Tomlinson, secretary. He arrived by air from Yeovil in the Westland-Sikorsky S.55, seen in the background. This aircraft is similar in type to the two machines which recently completed the first long-route crossing of the North Atlantic by helicopter.

flew on the trials; next day, Lord Douglas of Kirtleside.

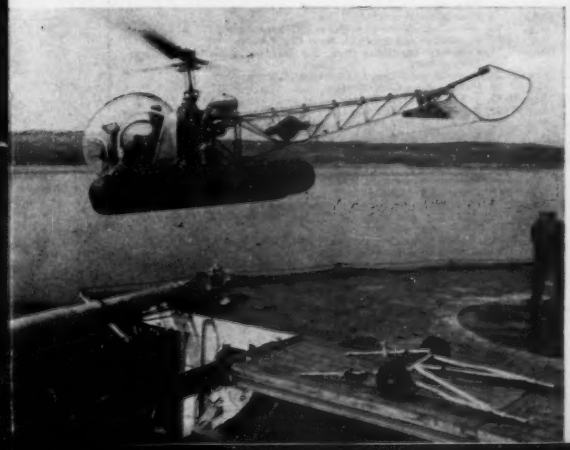
The Bell helicopter (illustrated below) carried by Canada's polar supply-ship *C. D. Howe* is proving valuable in guiding the ice-breaker through the heavy pack ice that hems-in the settlements strung out along the coast of Canada's "Eastern Arctic." It is also proving invaluable in ferrying personnel between ship and settlement when the coastal ice is beyond penetration or too dangerous to penetrate.

The *C. D. Howe* is well into her third annual round of the meteorological and radiosonde stations dotted along Canada's north-eastern coast, R.C.A.F. stations, Royal Canadian Mounted Police posts, mission stations, Eskimo and Indian settlements and fur-trading posts. She carries for them supplies sufficient to last another twelve months, and personnel to relieve men whose spell of duty in the Arctic is over. Also aboard are doctors and dentists engaged on checking-up upon the health of Eskimo, Indian and "white." When necessary the helicopter is used to put them ashore, and it is also used to fly to inland locations the geologists and other scientists engaged in studying the many problems concerned with life in the Arctic.

The waters of Canada's Eastern Arctic are among the most dangerous anywhere in the world. The power in moving sea-ice is almost beyond description. There are records of pack-ice being forced in house-sized blocks as much as half a mile inland by the pressure of wind-driven floes out to sea, and the turmoil of heavy "pack" grinding along a rocky shore is frightening.

Built for the Department for Transport in Ottawa, the *C. D. Howe* is specially strengthened for her contests with the ice. But probably her greatest insurance against damage by ice is the helicopter housed on a specially strengthened deck forward. And it is probable that helicopters will soon become standard equipment for all polar supply-ships of a size sufficient to accommodate one.

(Below) Three delightful action studies of the Bell helicopter which has thoroughly earned its keep on Canada's polar supply ship the "C. D. Howe." One of its principal duties is to guide the ship through pack ice; another is to set down and pick-up scientific observers.



CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Flight Despatchers

I READ with some interest Mr. Rupert Giles's plea for the flight-despatch system, published in *Flight* of July 25th, 1952. Mr. Giles ends his article, ". . . a system which has proved itself economically. . . ." How can a system which duplicates many of the responsibilities of Air Traffic Control and of operating pilots be proved economical? On August 2nd, 110 B.E.A. flights will depart from Northolt, plus eight more from London Airport. How many despatchers would Mr. Giles require for these 118 flights? What would he pay them? How would their work contribute to B.E.A.'s revenue? Come to that, how would they contribute to B.E.A. passengers' safety?

The captain of an aircraft always *is*, and always will be, finally responsible for the welfare of his passengers; there is no question of personal vanity except in the care of his own skin.

St. Albans, Herts. R. E. ATKINSON.

Spit and Polish

I WONDER if Mr. S. M. Todd Webb, in his letter "Seen at Gib." (*Flight*, July 4th) meant that the R.N. aircraft which he saw were in an indifferent state of servicing or in an indifferent state of repair? Naval aircraft must lead a pretty rugged existence and one wonders if those aircraft were landed ashore at Gib. simply because they required servicing or repair before being fit for further operation from the deck?

Be that as it may, a correspondent, Mr. Charles B. Luce, in the July 18th issue ("Abolish the Barrack Square?") raises an interesting point over this matter of aircraft servicing. There must be many a squadron C.O. who has thought along similar lines. Cut out the "ceremonial mumbo-jumbo" and use the time for servicing instead!

It sounds too easy, but even in this "atomic age of jets and supersonics" it's the crew that matters, and we're far from infallible. Men work best if they and their surroundings are clean and smart, which can only be achieved by inspection or "brass and blanco."

Experience on the job still shows that a nice balance between servicing (technical) and bull (traditional) seems to be the best way to obtain peace-time efficiency.

London, S.E.18. CONVERT.

[In all fairness to the Naval personnel responsible for maintaining the aircraft referred to by Mr. Todd Webb, we would suggest that by his phrase "indifferent state of servicing" he may have intended to convey that the aircraft were travel-stained. Many a sound mechanical heart beats beneath an oil-splashed skin.—ED.]

The Drift Overseas

WITH reference to *Flight* dated July 11th, your correspondent, "Technician," gives his reasons in answer to Mr. Petter's letter as to why there is a drift of technical personnel to other parts. While agreeing with him whole-heartedly, it would seem to me that the prime mover is frustration.

A good many readers will be aware of the apathy existing in the industry today (accounting for a good 50 per cent of the time taken between prototype and production aircraft) and the feeling that one is constantly banging his head against a brick wall.

An active chief designer could solve the problem thus :—

(*a*) By recognizing ability (not social climbing).

(*b*) By creating and keeping his design staff interested in their products, ensuring that the latest information is available for their use and that they know where they are going. In fact, doing everything that a chief designer is paid to do.

Cheltenham, Glos. DENNIS A. RATTLE.

Those Skyblazers

I WAS not surprised to learn from your report of the recent NATO display (*Flight*, July 18th) that those dashing American showmen, the Skyblazers, again carried off the acrobatic honours. Nevertheless, although their technique clearly surpasses the best the R.A.F. can show, I am inclined to the belief (having seen several of their performances) that a major contribution to success is made by certain characteristics of their equipment.

In the first place, the Thunderjet is at once sleek and compact. The pilot is almost perfectly situated with regard to view and has at his command what I believe are recognized as an exceptionally fine set of powered controls. Then, of course, the smoke-trailing Allison turbojet plays an important part, while the tightness of the formation is emphasized by the massive wing-tip fuel tanks, which have the visual effect of knitting the formation together. The colour scheme, moreover, is most striking. But even when all these points are given due weight, the incontestable excellence of piloting skill remains.

Still, I have a notion that, when the lads of 2nd T.A.F. take delivery of their long-awaited Venoms, we shall see performances in the same class—always supposing, of course, that sufficient flying time can be allocated to the practice of what, surely, is the most spectacular and aesthetically satisfying form of self-expression.

Edinburgh. S. PORTER.

Displays and the Public

I FEEL that "Rubberneck," in his letter appearing in your issue of July 25th, is unduly hard upon the organizers of air displays. Obviously he fails to realize the great expense incurred in holding any form of flying meeting, an expense that remains at the same high level whether the show runs through in its entirety or whether, as so often is the case, the elements take over. Insurance, labour, arrangement and control of enclosures, etc., have to be paid for regardless of the result.

In a case where an organizing body may be a flying club, the available funds cannot possibly extend to the repayment of gate money in the event of bad weather. Even when conditions are good and a programme is flown according to plan, expenditure often exceeds receipts, so if a club were forced to repay 2s or so to each spectator, the inevitable result would be akin to bankruptcy.

The cost per head is negligible, but when this is multiplied by a few thousand a very different story presents itself, so this is one case where the public can usefully look at the other side of the picture. Whereas the spectator may bemoan his temporary embitterment, the organizer may be suffering from an incurable financial headache—and then who is able to provide the displays?

Windsor, Berks. DAVID F. OGILVY,
Honorary Secretary,
The Vintage Aeroplane Club.

[We are aware that the V.A.C. have been unlucky with the weather this summer: but we since learned that they were not one of the clubs which the previous correspondent had in mind.—ED.]

YOUR correspondent "Rubbeneck" raises an important point when he writes of the responsibility of air-display organizers towards a paying public. However, British weather being what it is, I feel that in many cases the clubs are deserving of sympathy.

What in my opinion is most desirable is that organizers should show more imagination and initiative than they do at present in drawing up their programmes. All the old "hardy annuals"—instructor-and-pupil, spot landing, balloon-bursting, flour-bag bombing, etc., first seen in the 1920s—should be rigidly excluded unless they can be presented in such a manner that they provide entertainment instead of boredom. This calls for imaginative presentation and very expert piloting, carried out as close to the public enclosures as safety permits.

London, W.1. AUSTER PILOT.

FORTHCOMING EVENTS

Aug. 13-17. Nordic A/2 Models Contest, Austria.
Aug. 15. Aéro-Club de Charente Maritime: Lalou and La Rochelle Air Meeting.
Aug. 15. Ailes Montluconnaises: Rally.
Aug. 16. Aéro-Club de Vendée: Sables d'Olonne Rally.
Aug. 16-17. Bembridge and Sandown Aero Club: Rally.
Aug. 23. Coventry Aeroplane Club: Air Day and Siddeley Challenge Trophy Race.
Aug. 23-24. Aéro-Club de Trente: Dolomites Circuit.
Aug. 30. Midland Aero Club: Display.
Aug. 30-31. U.S. National Air Races.
Aug. 31. A.B.A.C.: Summer Convention.
Aug. 31. S.M.A.E.: British Model Championships, College of Aeronautics, Cranfield.
Sept. 7. Scandinavian Air Rally.
Sept. 1-7. S.B.A.C.: Flying Display and Exhibition, Farnborough.
Sept. 7. "Yorkshire Evening News" Model Flying Festival, Sherburn-in-Elmet.
Sept. 15. Battle of Britain Day.
Sept. 15. I.A.T.A.: Eighth Annual General Meeting, Germany.
Sept. 17. Golf: R.N. and W.R.N.S. v. R.A.F. and W.R.A.F., Camberley.
Sept. 20. R.A.F. At Home Day.
Sept. 21. S.M.A.E.: Models Contests, Butlin's Holiday Camps.
Aug. 30. Vintage Aeroplane Club: Rally.
Sept. 14-23. Milan Flying Display, Show and Congress, Forlanini Airport.
Sept. 24-25. Aerodrome Owners' Association: Annual Conference.
Sept. 28. Aéro-Club de France: Coupe Stamm Helicopter Competition.

Do you know your airfields?

25

Recognise this airfield? It's No. 25 in this series of puzzle photographs. You'll find the answer below on the right.★

A boiling summer day. The hangars mirage-like above the tarmac. Not a soul about except the airport cat stretched in the sun. And, of course, the familiar Shell and BP Aircraft Servicing Vehicle with its alert, lively crew—ready to turn out and give you first-class service whether it's 90° in the shade or a howling blizzard. You can get this famous year-round Shell and BP Aviation Service at twenty-six aerodromes in Britain.

Shell and BP Aviation Service

Shell-Mex and B.P. Ltd., Shell-Mex House, Strand, London, W.C.2.
Distributors in the U.K. for the Shell
and Anglo-Iranian Oil Groups.

★ Hamble

Movement Controlled-by the TASKMASTER

A drawbar pull of 3800 lb. enables the David Brown Taskmaster to handle aircraft up to the Convair, Viking, and Dakota class with ease and safety. The 4-speed gearbox with its low-ratio 1st gear equips the driver for full-power 'break-out' with easy under-way gear-shift to suitable working speed. The David Brown Taskmaster speeds up ground movement, lowers fuel costs, and although primarily designed for aircraft handling it can turn its hand to every conceivable haulage job around the airfield.

- ★ OHV ENGINE DEVELOPS 39 B.H.P.
- ★ 3800 LB. DRAWBAR PULL
- ★ TOP SPEED 22 M.P.H.
- ★ LARGE TYRES GIVE GREATER TRACTION
- ★ EXCEPTIONAL FUEL ECONOMY
- ★ WIDE BENCH-TYPE SEAT
- ★ FULL LIGHTING & STARTING EQUIPMENT

DAVID BROWN
INDUSTRIAL TRACTORS

INDUSTRIAL DIVISION; DAVID BROWN TRACTORS LTD., Meltham, Huddersfield, Yorkshire.
(A DAVID BROWN COMPANY)

FLEXIBLE METALLIC HOSE ASSEMBLIES

Designed for applications beyond the range of our synthetic rubber assemblies, these units, of all stainless-steel construction, cover

A TEMPERATURE RANGE of −100° C to + 350° C.
PRESSURES up to 1,000 lb/sq. in.

Standard assemblies are suitable for aircraft and aero-engine fuel, oil, hydraulic, pneumatic, drain, vent and high-temperature air-ducting lines. Rocket and guided weapon control systems and charging lines. Special test-rig applications.
Metallic assemblies incorporating short brazed couplings are in use as ignition harnesses, thermocouple leads, etc.

VISIT US AT STAND NO. 164

TRADE MARK

AVICA EQUIPMENT LTD

1, ADAMS PLACE, GEORGES RD., HOLLOWAY, LONDON N.7. Telephone: NORTH 4281

IN U.S.A. and CANADA—Avica Corporation: Portsmouth, Newport, Rhode Island. EXPORT MANAGERS—Worldmarket Ltd., 50 Pall Mall, London, S.W.1.

OUT AGAIN: On the last day of July the Bristol 173 made its longest and most extensive test-flight to date. Mr. C. T. D. Hasegood, accompanied by Mr. Keith Turner, flight observer, tried the aircraft in each direction—forward, sideways, and backward—and turned in a complete circle before making what was described as a perfect landing. The aircraft first flew in January, chiefly to prove the control system, but has since been on the ground pending exhaustive tests of transmission and modifications to the undercarriage to overcome ground resonance. The photograph above was taken during the latest test flight.

CIVIL AVIATION

LOW-FARE INFLUENCE

RESULTS for the first two months of B.O.A.C.'s new North Atlantic services have confirmed the belief that low-fare flights would not affect the number of passengers flying on normal services, but, on the contrary, would attract new custom to the air. Between May 1st (when the Mayflower and Beaver Constellation tourist services began) and June 30th, B.O.A.C. carried a total of 13,567 passengers on all its North Atlantic services. This represents an increase of more than 37 per cent over the figure for the similar period last year.

The standard services showed a slight increase in passengers carried, and 2,200 used the new tourist services. The biggest single increase, nearly 64 per cent, was in the number of passengers who flew from New York to London. The totals were 3,767 in May and June 1951 and 6,175 in the corresponding period of 1952.

AGAINST PRESSING-ON

IN *M.C.A. Information Circular No.* 67/1952 private pilots are reminded of the need for extreme care in planning flights in unfavourable weather. It states that a number of accidents involving deaths, serious injury and substantial aircraft damage have occurred to light aircraft during precautionary landings following flight in bad weather: "Although the immediate causes of the accidents may have been, for example, stalling on the approach or selecting a field with a rough surface, the real causes can be attributed to lack of judgment on the part of the pilots concerned in attempting to fly in conditions beyond their ability and experience."

C.P.A.'s CONVAIR-LINERS

THE first of five Convair-Liners ordered by Canadian Pacific Airlines is due to be delivered at Vancouver in December, and the remaining four early in the new year. The use of these aircraft on the Canadian and Alaskan routes shown in the adjacent diagram is expected to reduce considerably the present flying times, while the 20,000ft cruising altitude will increase passenger comfort. C.P.A. are impressed by the built-in hydraulically-operated steps, which, controlled by the pilot, save much time when a number of calls have to be made.

The C.P.A. Canadian and Alaskan routes on which Convair-Liners will fly, with new stage-times.

B.E.A. RESULTS

BRITISH EUROPEAN AIRWAYS are able to announce an increase—7 per cent—in the total number of passengers carried on their international services, for the four-month period from February to May. The re-imposed £25 currency limit seriously limited the proportion of British passengers flying to the Continent; for all forms of transport, the decrease was 22 per cent.

Commenting on this fact in the current issue of *B.E.A. Magazine*, Mr. Peter Masefield (chief executive) says that the Corporation's overall increase "shows we are getting an increasing share of what's going but, even so, our rate of increase is, of course, seriously down." In May, he points out, the fuel cuts caused by the U.S. oil strike aggravated the effects of the travel restrictions and resulted in a fall of £176,482 in B.E.A.'s budgeted revenue which, even so, was £142,815 (15 per cent) up on last year.

"Our expenditure in May," says Mr. Masefield, "was £1,238,977—which is 24 per cent more than May 1951. The result was a deficit of £155,287 for May 1952 compared with a deficit of £55,895 in May 1951."

Thanks partly to the new Silver Wing service (which achieved load-factors of 94 per cent in both directions during its first month of service) the London-Paris route showed an increase in passenger traffic of approximately 10 per cent. Through services to Cyprus had got under way in a most encouraging manner. Mr. Masefield added that the Elizabethan, which carried an average of 33 passengers on each service on this route, showed to their best advantage on these long trips, making the 4,350-mile return journey at a block speed of some 210 m.p.h., including circuit and taxying time.

HOME FROM HELSINKI

FOR the Olympic Games, B.O.A.C. arranged a number of special flights from Helsinki last week. The Canadian team returned to London on August 3rd and 4th in three Hermes, and the South African team also travelled from Helsinki in the same type of aircraft. On August 5th two parties of the Chilean team left Helsinki in an Argonaut and a Hermes, bound respectively for Paris and London. Yesterday members of the Finnish Association of Canada returned to London by Hermes. A special Comet flight was arranged on August 5th to bring the Dukes of Edinburgh and Kent home from Helsinki, stopping overnight at Oslo.

CHARTER NEWS

DURING the last week of July, British independent air transport operators completed approximately 85 freight and passenger charter flights. These were quite apart from the regular trooping and commercial contract work with which most of the larger operators are now principally engaged.

Calculations suggest that in the seven days under review about 25,000 miles of *en route* flying were completed. Of this total some 15,000 miles were flown on freight work and the remainder on passenger flights. About 350 tons of goods and nearly 1,000 passengers were transported.

The majority of passenger flights involved the seasonal movement of students in York and Viking aircraft. Eagle Aviation made York flights between Copenhagen and Gothenburg, Paris and Bovingdon; they also made one flight from Bovingdon to Copenhagen. Crewsair flew students to Ndola, Paris and Copenhagen, while Skyways, with York aircraft newly based in Germany,

The Philippine Air Lines DC-6B "Magellan's Cross" at London Airport shortly before departure on its first east-bound passenger flight. Further details are given in a paragraph below. The flight attendants on its visit to London were Maria Teresa Larrazabal (left) and Christina de la Riva.

CIVIL AVIATION . . .

undertook student flights between that country and Denmark.

Scottish Aviation made two Dakota flights to the Middle East. One was to Nicosia and back for the N.A.A.F.I. and the other to Bahrein on the Persian Gulf for the Iran Petroleum Company. Other passenger work included a flight by a Silver City Bristol 170 from Le Touquet to Lympne with 35 members of the band of the 4th Queen's Own Hussars.

Silver City Freighters also carried the majority of last week's freight business. Altogether they made six horse flights and carried 24 horses. Twelve were flown on the almost daily Paris-Blackbushe run, and the remainder, comprising the French and Egyptian Olympic jumping horse teams, were flown from Paris to Helsinki together with their riders, ostlers and saddlery. The official Canadian horse team was taken to Helsinki from Bristol in a York aircraft operated by Skyways of London (Lancashire Aircraft Corporation).

Bristol 170s also completed three pigeon flights between Copenhagen and Antwerp, and Silver City thereby brought their total of birds flown this year to more than 50,000. Pigeons are sent in bulk by international associations representing the interests of hundreds of competing owners. At an approximate cost of between 4s and 5s per bird for a flight of about 600 miles the individual rates seem very reasonable.

Another cargo for the 170s was ten tons of Normandy cheese, taken in two flights from Normandy to Lympne. Because these cheeses are highly perishable they have a very short selling life in the shops. Consequently, if four or five days are spent in delivery by surface methods they cannot be sold in the stores of the Midlands and North of England, and potential trade is lost. By using the air ferry road-air-road method the cheeses are taken from producer to retailer in less than 48 hours. This allows the Normandy dairymen to sell their products to new and untapped markets, thus substantially increasing their turnover and revealing further hidden economies of air transport. An additional example of French dairy produce flew the Channel last week in the form of three tons of sour milk for use in making yoghourt.

The only other freight fixture reported during the week under review was for one of Eagle's Yorks to take a load of ship's spares to Sicily for Pan American under sub-charter. The main bulk of the British independent operators' freight work is carried out by Air Charter Yorks and Silver City Bristols on the "Berlin Minor Airlift"; last week they made nearly 60 single trips from Berlin to Hamburg, each with a full load of freight. The airlift is still continued because the Russians blockade certain West Berlin exports. This category includes such things as machine tools, generators, radio equipment, electric light bulbs, scrap metal, and even diesel lorries.

PHILIPPINE DC-6BS

THE first of two Douglas DC6-Bs purchased by Philippine Air Lines visited London recently on a service flight from Manila. These aircraft have accommodation for 54 passengers and the two windows which may be seen forward of the wing on the port side are those of the private four-seat cabin which is a feature of the layout. The aircraft are to be used on the company's twice weekly Pacific service between Manila and San Francisco. One of the machines, named *Magellan's Cross*, is illustrated above.

BREVITIES

THE Hon. T. L. Macdonald, New Zealand's Minister of Civil Aviation, said recently that although his Government was not at present contemplating the purchase of helicopters, it would be glad to make suitable arrangements for the use in rescue work of any helicopters which might be imported by commercial firms.

* * *

Following the Privy Council Judicial Committee's decision in their favour (reported last week), the American operators, Civil Air Transport, Inc., took formal possession of the 40 airliners (DC-3s, Commandos and Convair-Liners) at Kai Tak, Hongkong. The aircraft—now under a strong security guard—are to be shipped out during the next two months. C.A.T. is still awaiting judgment on 31 more aircraft claimed by the Communists.

* * *

The New Zealand Government is to encourage commercial operations (with the exception of agricultural top-dressing) by flying clubs, provided their aircraft are suitable and they confine their activities to within a reasonable distance of their base. The Air Secretary, Mr. T. A. Barrow, recently made this statement of policy before the Air Licensing Authority.

* * *

It is reported that Indonesia's national airline, Garuda Airways, jointly owned by the Indonesian Government and K.L.M., is offering Australian pilots between £30 and £40 sterling per week to join its staff. Normal rates of pay for a first officer in Australia are quoted as about £1,200 a year, depending upon seniority, and for a four-ring captain as between £A1,200 and £A1,650. Garuda operates DC-3s and Convairliners on Indonesian internal services and also flies between Jakarta, Singapore and Manila.

Trans Canada Airlines announce the appointment of Capt. Bert Trerice as check pilot for international services and Mr. H. Horne as chief flight engineer. Capt. Trerice was at one time a member of the Ellsworth and Wilkins Antarctic expedition, having been selected as a result of his experience as a bush pilot.

* * *

A school of aviation is to be set up at Limerick Technical Institute, ten miles from Shannon Airport, by arrangement with Aer Lingus, the Department of Education, and the Limerick Vocational Education Committee. Facilities are planned for student pilots of aero clubs and holders of private licences to qualify for commercial service. For a start it will cater for some 25 students.

* * *

Pan American plan to expand their transatlantic cargo service and extend it to the Middle East. The additional service is, in effect, a resumption of one previously operated but discontinued when it became necessary to divert aircraft to cater for Berlin cargo requirements. As from September 1st, a DC-4 will make a weekly round trip flight from New York, serving London, Brussels, Frankfurt, Istanbul and Beirut.

* * *

Since Trans Australian Airlines' Convair-Liner *Thomas Mitchell* was delivered in October, 1948, it has flown more than 10,000 hours and covered more than two million air miles (this actual figure was reached in May). This is believed to be a record not only for a Convair, but for any type of commercial airliner, and in recognition a silver plaque has been sent to Mr. L. J. Brain, T.A.A.'s general manager, by Consolidated Vultee president General J. T. McNarney.

FROM THE CLUBS

NEW POST: Dennis A. Cather (see reference below) with one of the Toronto Flying Club's Piper Clippers.

SINCE we received the Wiltshire Flying Club's claim to the highest total flying time for this year (1,376 hr), Mr. F. E. Darlow, secretary of the Herts and Essex Aero Club, has sent news that his club has flown 1,752 hr since January. During June 413 hr were recorded and, in addition, 23 first solos have been made since the beginning of the year. Licences have recently been obtained by T. J. Bainbridge, F. J. Boswell, G. R. Brunet de Rochebrune, F. A. M. Buckland, C. J. Hasler, Miss E. Jackson, D. M. Nelson, C. E. Pain, A. C. Swire, A. L. Tebbit, T. B. Warren and D. Wetton. On Tuesday, July 15th, a record number of first soloists were launched; Cadets R. F. V. Green and T. J. Vidal-Hall were sent off before 0900 hr, closely followed by Miss R. Keena, winner of the Women's Junior Air Corps flying scholarship.

Broxbourne's newest private owner is Mr. Ronnie Riches, who learned to fly at the club two years ago and is now the owner of Messenger G-AJKL.

ALTHOUGH defeated by weather on its last two major occasions, the Vintage Aeroplane Club is to make another attempt to carry out in full a rally, on Saturday, August 30th. The venue, though not definitely fixed, is expected to be White Waltham. Although some 40 vintage aircraft are on the club's register the last few meetings have rarely produced more than a dozen or so, and these always the same machines; it is hoped, therefore, that the owners of the remaining 30 will make a note of the date. A further demonstration competition will be held (similar to that won by C. A. Nepean Bishop in the Cadet on May 31st) and, in addition, formation competitions, spot landing, bombing and many other similar items will also be staged. It is hoped to include the dog-fight between the Hart and Gladiator, which was to have taken place at the last V.A.C. rally, and a parachute competition is being held.

On Saturday, August 9th, the V.A.C. is holding an aerial picnic visit to Bembridge, Isle of Wight, where members will, it is hoped, have the opportunity of exchanging their airborne mounts for the local yachting club's waterborne variety. A lobster lunch (for which the Bembridge Flying Club is renowned) and swimming at White Cliff Bay are added attractions. Those intending to fly down are invited to congregate at Denham during the morning and proceed *en masse*, arriving in the I.O.W. at about 12 o'clock.

DENNIS A. CATHER, well-known and much missed C.F.I. of the London Aeroplane Club, is now instructing at the Toronto Flying Club, and in the photograph above he is seen beside one of the club's three Piper Clippers. The T.F.C.'s fleet consists of, in addition to these three, four Fleet Cannucks.

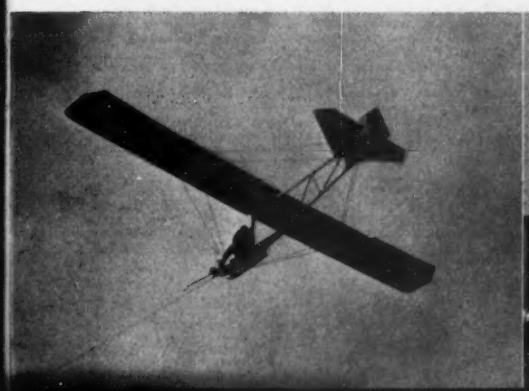
The Canadian flying clubs are working very hard and they receive help from the Government, since there is a $100 bonus for each licence obtained. The Cannucks cost $14 an hour and the Clippers $10 solo or two up, or $14 when used with three or four up. Prices are reduced by 10 per cent when hours are bought by bulk payment in advance. (This scheme is of course applicable to most of the clubs in this country.) The Toronto club also has six Chipmunks on loan from the Department of Defence for R.C.A.F. Reserve training.

The C.F.I. (Al Bettridge), Dennis Cather and four part-time instructors are kept very busy, both by night and day, seven days a week, because night-flying instruction is included in the schedule. Malton Airport has the advantage of being under full radio flying-control procedure, so that pupils can get accustomed to modern methods and, of course, night-flying facilities are always available.

THE Bristol Gliding Club reports more activity in the last few weeks than for many months, and those who had chosen the week beginning July 20th to hold their soaring camp were richly rewarded by many successful cross-country flights. Bill Moreton, flying a Grunau, won his Silver "C" distance leg with a 39-mile flight to Blackdown, Dorset (this was, incidentally, the B.G.C.'s first Silver "C" this year), while Maurice Chantrill and Mike Garnett (both in Olympias) were successful in attaining good heights. Garnett, who reached 4,850ft, won his Silver "C" height. On Friday, Mike Hodgson, on his first cross-country flight, gained his Silver "C" distance and height, and, in addition, broke the club distance record. He was able to cruise at 60 m.p.h. between thermals on his 91-mile flight to Launceston, Cornwall and at one point staggered a couple of R.A.F.V.R. Chipmunk pilots by overtaking them at 120 m.p.h.

PICTORIAL PROOF: In our report last week of the Royal Engineers Flying Club's air day we referred to F/L. Piggott, of the R.A.F. Gliding School, being "towed draughtily round the sky behind an Auster" before performing some remarkable aerobatics in a primary trainer: this is what it looked like as it passed overhead. On the right—again quoting the report—is D. C. Armstrong "floating around at odd angles in the Zaunkoenig."

"Flight" photographs



CIVIL AVIATION . . .

THE A.T.A.C.'s TERMS of REFERENCE

IN accordance with the general arrangements announced in Parliament on May 27th, the Ministry of Civil Aviation has now issued the terms of reference to the reconstituted Air Transport Advisory Council and notice has been given that the Council is ready to receive applications from the Corporations and British air transport companies to operate scheduled services and inclusive tours. The members of the Council (subject of a news story in last week's issue) are Lord Terrington (chairman), Viscount Runciman, Sir John Ure Primrose, Mr. Gerard d'Erlanger and Mr. J. J. Taylor.

Applications received will be considered in accordance with the terms of reference, and recommendations will be made to the Minister, whose decision will be final. Standard forms must be used for applications, and copies can be obtained from the Secretary of the A.T.A.C., at 9 Buckingham Gate, London, S.W.1. For internal services three months' notice is required before the proposed starting date, and for international services four months. In exceptional circumstances short-term (maximum 14 days) services at home may be considered if the application is received not less than 21 days before the starting date.

The Council may decide to hold inquiries at which applicants and interested parties can appear to state their cases; these may be in public or in private, according to the circumstances. Seven days' notice will be given of private inquiries and 21 days of public inquiries. The terms of reference begin as follows:

"It is Government policy to help forward the sound development of civil aviation, to reduce the cost of air transport to the taxpayer and to give greater opportunities to private enterprise to take part in air transport development, without in any way impairing the competitive strength of our international air services. The statutory Air Corporations have established an important position in the highly competitive field of international air transport, and by avoiding any measures that would undermine their existing international network, it is the intention that they shall retain that position. The Corporations will accordingly have reserved to them the right to provide both first and second (or tourist) class services, as defined for the purposes of the International Air Transport Association, on their existing International networks. The independent companies and the Corporations will alike be eligible to apply for the right to develop new routes not so reserved to the Corporations and all new types of scheduled services.

"On internal services within the U.K., the Government's objective is to reduce and as far as possible eliminate the cost of these services to the taxpayer and to give special consideration to the particular requirements of certain areas. Until the Government have completed their study of the complex problem of giving effect to this policy, B.E.A. will continue to provide services on their existing internal network, but independent companies will be able to apply under the new arrangements for long-term rights to provide services which do not materially divert traffic from B.E.A.'s internal services. They will not be affected, as before, by B.E.A.'s planned development of routes on which they have not yet operated. No subsidies will be granted to independent companies obtaining rights to operate scheduled services within the sphere of opportunity now presented."

The Minister proposes for the time being to implement this policy by an extension of the arrangements under which the Corporations appoint independent operators as Associates under Section 15 (3) of the Air Corporations Act, 1949.

As an Appendix to the terms of reference there are two schedules, A and B (summarized at the foot of Col. 2), the former specifies routes on which, under the Government's new policy, the Corporations will have reserved to them the right to operate normal scheduled services, providing for passengers at first and/or second class (tourist) fares, as defined for the purposes of the I.A.T.A., mail and supplementary freight—referred to as "normal scheduled services". Schedule B specifies the routes on which the Corporations will have the right to operate "all-freight" services. The terms of reference then continue:—

"The Minister will be prepared to consider under these arrangements proposals for:—

"(i) The operation by independent companies on any internal route of services which would not materially divert traffic from either B.E.A. on internal services or from independent companies already authorized to operate, under current Associate Agreements.

"(ii) The operation by B.E.A. of services on any new internal route, not forming part of their approved network and not approved for an independent company under a current Associate Agreement, provided that such services would not materially divert traffic from independent companies authorized to operate under current Associate Agreements.

"(iii) The operation by independent companies, to places outside the British Islands, of 'normal scheduled services' on any route which is not specified in Schedule 'A' or for which another operator has not been already approved for such services or which is not designed to cater primarily for the same traffic areas as a route so specified or approved.

"(iv) The operation by a Corporation to places outside the British Islands of 'normal scheduled services' on any new route not forming part of their approved network and for which no independent company has been authorized to provide 'normal scheduled services,' provided that such a service is not designed to cater primarily for the same traffic areas as a route so authorized.

"(v) The operation of a 'Colonial coach' class passenger service by an independent company or by one of the Corporations along any route, whether included in Schedule A or not, provided the proposed service is of such a nature as to generate a new class of passenger traffic without material diversion of traffic from the 'normal scheduled services' of any other previously approved U.K. operator, and does not involve the right to pick up or set down passenger traffic in territories where relations with the U.K. are governed by bilateral Air Transport Agreements and/or where fares are subject to I.A.T.A. arrangements. For this purpose a Colonial coach-class service will have to be:—

(*a*) a lower class of service than that of normal scheduled services, e.g. as regards type of aircraft, shorter stage lengths, passenger amenities, baggage allowance, etc., and

(*b*) operated to a stated frequency closely related to the requirements of the new class of traffic in the territories in which rights may be exercised and at a fare not exceeding a fixed sum (without rebates) low enough to ensure dependence on the new class of traffic.

"(vi) The operation by a Corporation or by an independent company on any route (including those specified in Schedule A) of services confined to the carriage of passengers who pay an inclusive charge for air transport and hotel accommodation, other than 'night-stop' accommodation incidental to a normal scheduled journey, (i.e. Inclusive Tour services), provided that such services are not likely materially to divert traffic which would otherwise be carried by any operator already authorized for the route.

"(vii) The carriage of freight traffic by a Corporation or by an independent company either as an exclusive load, or as a supplementary load on services authorized under (v), (vi) or (viii), provided the position of any previously authorized operator is not likely to be undermined.

"(viii) The operation of any route of vehicle ferry services which may also provide for the carriage of incidental passengers so limited in number as to avoid material diversion of passenger traffic from other authorized services.

"(ix) The operation by a Corporation or an independent company on any route of a service from which a Corporation or independent company has withdrawn for other than temporary or seasonal reasons.

"(x) The operation by a Corporation or by an independent company on any route of a helicopter service irrespective of the existence of a fixed-wing aircraft service."

The terms of reference next go on to indicate the circumstances in which the Minister's approval would be given for an Associate Agreement between an independent operator and one of the Corporations. They are subject to his being satisfied that the applicant's equipment, personnel, organization and operating standards are adequate to meet the requirements of the Civil Aviation Act, 1949; that there is no foreign investment or other foreign interest in the undertaking; and that the terms and conditions of employment of the applicant's staff are in accordance with national joint council agreements. In addition, on international services, the fares, freight rates, and so on must comply with agreements between the U.K. and other countries, rates for carriage of mail must be comparable with those charged by the Corporations, and the applicant must show that his financial resources are adequate to provide and maintain the requisite standard of services.

On receipt of an application it is the task of the Air Transport Advisory Council to consider whether it fulfils or is likely to fulfil if approved by the Minister, the various conditions outlined in the above paragraphs, and if so, to recommend to the Minister whether or not he should approve it. The terms of reference indicate that, in considering applications, the Council should pay particular regard to the requirements of the public in the area concerned; the availability of ground and navigational facilities; the adequacy or otherwise of services already provided in the area; the period for which services have already been operated by the applicant or another operator; the applicant's previous record and probable ability to provide satisfactory services in respect of continuity, safety, regularity and frequency; the type of aircraft proposed for use; the amount of traffic and gross revenue on which the application is based; the suitability of the fares and rates proposed; and other relevant matters. It is, finally, the Council's job to recommend the period for which the Minister's approval of an application should be given. This will normally be for a maximum of seven years, or ten in exceptional circumstances.

THE SCHEDULES

Schedule A Part One covers B.O.A.C.'s routes. Most of these are well known, but they may be summarized as from London to Sydney, Tokyo, Hong Kong, Singapore, Johannesburg, Lisbon, Montreal, New York, Auckland, Nassau, Rio de Janeiro, Buenos Aires, Santiago, and all the recognized intermediate points on these routes, including (in Europe) Frankfurt, Zurich and Rome.

Schedule A Part Two covers the routes of B.E.A. in Europe and to the Middle East:—London to Barcelona, Madrid, Gibraltar, Palma, Zurich, Geneva, Basle, Vienna, Paris, Nice, Deauville, Dinard, Le Touquet, Brussels, Dusseldorf, Berlin, Cologne, Hanover, Frankfurt, Amsterdam, Copenhagen, Stockholm, Oslo, Rome, Milan, Malta, Tripoli, Istanbul, Athens, Cyprus, Benghazi and Cairo. Both direct and stopping services to and between the cities are included.

Schedule B, concerning freight routes for the Corporations, is as follows:—Part I—B.O.A.C.:—London to Nice, Tripoli, Cairo, Bahrein, Karachi, Delhi, Calcutta, Bangkok, Singapore. Part II—B.E.A.:—London to Amsterdam, Hamburg, Berlin, Copenhagen, Stockholm, Paris, Brussels, Hanover, Nice, Rome, Malta, Milan, Athens, Istanbul, Zurich, Vienna.

"Flight" photographs

PRIZE-WINNERS AT CRANWELL: (Above) Left to right: F/Cdt. U/Off. D. G. Slade, F/Cdt. Sgt. A. G. N. Hampton, S. F/Cdt. M. K. Khan, F/Cdt. Sgt. J. W. Heard, F/Cdt. U/Off. R. A. Streatfeild, S. F/Cdt. U/Off. A. Beill, F/Cdt. Sgt. A. G. Hamilton and F/Cdt. U/Off. J. M. Boden. (Right) Preceded by two slow-marching orderlies, Lord Alexander inspects the graduation parade.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Cranwell Graduation Parade

THE Minister of Defence, Field Marshal the Rt. Hon. the Earl Alexander of Tunis, was the reviewing officer at Cranwell last week for the graduation parade of No. 56 (General Duties) and No. 7 (Equipment and Secretarial) Entries.

Lord Alexander had to return earlier than he had expected—owing to urgent Parliamentary business—but this did not interfere with the parade timetable. The high standard now expected of a Cranwell graduation parade was well maintained, in fact, the only slight slip was made by the Field Marshal himself—when he momentarily forgot that he was not in uniform and saluted the Colour and Senior Entry as they were marched off.

It is interesting to note the number of "second generation" names which now begin to appear in the lists of cadets passing out. In the 56th Entry, for example, were F/Cdt. Sgt. D. Harcourt-Smith, the son of A. V-M. Harcourt-Smith, who is now in Australia with the United Kingdom Liaison Staff; S. F/Cdt. J. H. D. Daly, son of G/C. Daly, now retired; and S. F/Cdt. D. R. K. Blucke, whose father, A. V-M. R. S. Blucke, has recently retired after his final tour of duty, in Singapore.

In this Entry, also, were four Halton apprentices who had won cadetships to Cranwell and of these F/Cdt. Sgt. J. W. Heard appeared in the list of prize-winners as the recipient of the Abdy Gerrard Fellowes Memorial Prize.

Another interesting feature in the prize list is the winning of the Dickson Trophy for applied flying by S. F/Cdt. M. K. Khan, R.P.A.F. This is the first time a member of the Royal Pakistan Air Force has joined the select band of Cranwell prize-winners.

The complete list of awards is as follows: Sword of Honour, F/Cdt. U/Off. R. A. Streatfeild; Queen's Medal, F/Cdt. U/Off. D. G. Slade; Medal of Honour, F/Cdt. U/Off. J. M. Boden; Philip Sassoon Memorial, F/Cdt. U/Off. D. G. Slade; Robert Marsland Groves Prize, F/Cdt. Sgt. A. G. N. Hampton; Dickson Trophy, S. F/Cdt. M. K. Khan; John Anthony Chance Prize, F/Cdt. U/Off. D. G. Slade; Abdy Gerrard Fellowes Prize, F/Cdt. Sgt. J. W. Heard; Air Ministry Prize for Imperial and War Studies, F/Cdt. U/Off. R. A. Streatfeild; Air Ministry Prize for Equipment Subjects, S. F/Cdt. A. Beill; Air Ministry Prize for Secretarial Subjects, F/Cdt. Sgt. A. G. Hamilton; R.U.S.I. Award, S. F/Cdt. J. Wilkinson. "C" Squadron, which was commanded on parade by F/Cdt. U/Off. Slade, was awarded the Prince of Wales Trophy.

The fact that the reviewing officer had to leave early meant that he missed the afternoon's programme, when there was an excellent display of aerobatics by a Meteor team from No. 245/266 (Rhodesian) Squadron, led by F/L. Ryan, and the dedication of a peal of six bells presented to the college by the Shell Group. When he dedicated the bells, the Rt. Rev. C. K. N. Bardsley, Lord Bishop of Croydon, also unveiled a memorial plaque—of the same metal as the bells—to the memory of former members of the College who had lost their lives while serving in the R.A.F.

After the dedication was completed the guests assembled on the "orange" to watch the Sovereign's squadron parade while "Retreat" was sounded on the new bells.

Naval Appointments

THE following appointments have been announced by the Admiralty: Capt. R. M. Smeeton, M.B.E., is to take over command of R.N. Air Station Hal Far and become Captain (Air) Mediterranean; and Capt. H. C. Browne, C.B.E., D.S.O. and Bar, will command R.N. Air Station Gosport. Capt. K. Williamson, D.S.O., becomes Captain Training on the staff of the Flag Officer Air (Home), and Capt. R. D. Watson, O.B.E., is to command H.M.S. *Illustrious*.

R.A.F. Appointments

HER MAJESTY THE QUEEN has approved the appointment of A. V-M. S. C. Strafford, C.B., C.B.E., D.F.C., as Inspector-General of the R.A.F. from October next. He will assume the acting rank of air marshal.

The Queen has also approved the appointment of A. V-M. G. H. Mills as A.O.C.-in-C. Bomber Command in suc-

A CRANWELL FAMILY: Air Chief Marshal Sir Hugh Walmsley, A.O.C.-in-C. Flying Training Command who was adjutant of the Boys' Wing at Cranwell from 1924 to 1927; his son Ian, who graduated from the College two years ago; Richard Walmsley, who will be going up to Cranwell in about four years time; Lady Walmsley, and Michael who graduates at the next passing-out parade in December.

SERVICE AVIATION . . .

cession to Air Chief Marshal Sir Hugh Pughe Lloyd when the latter retires from the R.A.F. in April, 1953.

A. V-M. Mills, who is 50 years of age, has been A.O.C. Malaya since early this year, and prior to that appointment headed the United Kingdom delegation to the Western Union Military Staff Committee. During 1949 and 1950 he was A.O.C. No. 1 Group, Bomber Command.

Australia A.O.C. for Malaya

THE Prime Minister of Australia, Mr. Menzies, has announced that the British and Australian Governments have agreed on the appointment of A. V-M. F. Scherger, R.A.A.F., as A.O.C. Malaya for two years. He will take over from A. V-M. Mills on January 1st next.

When making the announcement Mr. Menzies said he welcomed this further evidence of joint United Kingdom and Australian action for the security of Malaya.

A. V-M. Scherger is at present the head of the Australian Joint Staff Mission in Washington and is also included in the Australian delegation to the first meeting of the Pacific council in Hawaii, which opens on August 8th.

R.P.A.F. Leave Aircraft

A SPECIAL B.O.A.C. Argonaut left London Airport on July 30th for Karachi with 40 Royal Pakistan Air Force apprentices, who are taking the three-year course at No. 1 School of Technical Training at Halton and No. 1 Radio School at Cranwell. This is the first leave which has been granted.

On its return the Argonaut will bring a further 40 trainees to join the 600 already in Britain.

Shackletons for Ceylon

HAVING recently returned to Gibraltar from St. Eval, Cornwall, where they were temporarily stationed for operation "Castanets," six Shackletons of No. 224 Squadron, Coastal Command, have left on an 11,800-mile goodwill and training flight to Ceylon and back.

S/L. G. L. Mattey, D.F.C., is in command and during their stay in Ceylon the Shackletons will take part in exercises with ships of the East Indies Squadrons and the Indian and Pakistan navies.

R.A.F. Escaping Society

THIS year, again, the R.A.F. Escaping Society is inviting 52 children from France and Belgium to spend their holidays in Britain. All are from families who gave assistance to Allied airmen escaping from German occupied territory during 1940 to 1945. They will be entertained by members and friends of the society.

The holiday scheme, started last year, is the Society's way of showing their gratitude for the actions of the brave people in occupied Europe who sacrificed so much—in many cases their lives—to help the R.A.F.

FIRST EVENT in the calendar of the recently formed Southern Air Division, R.N.V.R., was the annual inspection by the Admiral Commanding Reserves, Vice-Admiral J. A. S. Eccles, C.B., C.B.E. The ceremony, followed by a fly-past, was at the division's H.Q. at Culham. Vice-Admiral Eccles, here seen shaking hands with Major E. M. Thursby, No. 55 Carrier Borne Air Liaison Group (Army), is followed by the Station's C.O., Capt. H. V. P. McClintock, D.S.O., R.N., and the Division's Senior Officer, Cdr. (A) G. Mc. Rutherford, M.B.E., D.S.C., R.N.V.R.

Carriers at Istanbul

THE light fleet carrier, H.M.S. *Glory* (wearing the flag of the Flag Officer Second-in-Command, Mediterranean Fleet, Vice-Admiral R. A. B. Edwards, C.B., C.B.E.), in company with the Canadian carrier *Magnificent*, formed part of the fleet which visited Istanbul from July 24th to July 30th.

R.A.F. Reserves' Club

THE R.A.F. Reserves' Club is at last able to announce that a building licence has been granted for the work necessary in converting No. 14, South Street, London, W.1, into club premises.

When these are ready—in about 16 weeks—and the club ceases to be a "lodger" at Hill Street, a greatly expanded membership will be the aim.

The secretary, S/L. W. A. G. Goldsworthy, has been obliged to retire, owing to ill health, and the name of his successor has not yet been announced.

For the S.B.A.C. display a motor coach has been hired to attend Farnborough on Friday, September 5th. The cost, including admission to the airfield, is 17s 6d each.

Field Service Caps Obsolescent

ORIGINALLY part of the uniform of the Royal Flying Corps, the field service cap was introduced into the R.A.F. in 1934. The Air Ministry now announces that officers will cease to wear them after December 31st next, but warrant officers will wear the caps until worn out.

In future, field service caps will be issued only to cadets at R.A.F. College, Cranwell.

Air Cadet Exchange

WHILE 50 cadets of the A.T.C. and R.A.F. sections of the Combined Cadet Force are spending three weeks in visiting the U.S.A. and Canada, cadets from those two countries are touring Britain. Visits to the Highlands of Scotland, beauty spots in North Wales, firms in the aircraft industry and the home of Lord De L'Isle and Dudley at Penhurst Place are part of the programme, which lasts from July 27th to August 21st.

Reunion

The sixth annual reunion dinner for R.A.F. members of No. 219 Squadron and Nos. 6219 and 6029 Servicing Echelons is being held in London on Saturday, September 20th. Tickets (£1 5s) and information may be obtained from S/L. D. W. B. Farrar, Royal Air Force Flying College, Manby, Lincolnshire.

ON THE OCEAN: A Fairey Firefly Mk 5, in the capable hands of Commissioned Pilot R. M. Brand, R.N., who cuts his engine to complete H.M.S. "Ocean's" record of 1,000 consecutive accident-free deck landings. The Firefly is from No. 825 Squadron R.N. On the right, Commd. Plt. Brand is seen sliding his canopy back after completing the landing.

"What a Kite! It's as smooth as its lubrication"

TECALEMIT'S long and extensive experience of Aircraft Lubrication and Filtration is such that Tecalemit precision-built components enjoy the confidence of Engineers and Aircraft Designers the world over.

If you have a problem affecting Lubrication, Filtration or Liquid Measurement, Tecalemit will be glad to send an engineer to discuss the matter with you.

TECALEMIT

The Authority on Lubrication

PLYMOUTH, ENGLAND

T.375

AVIATION TRADERS LIMITED

We offer the following selection of Spare Parts from our extensive stocks:—

5C/758	Fuse Box, 4-way, Type C.
5C/761	Fuse Box, 8-way, Type D.
6B/47	Douglas Combined Protractor and Parallel Rule. New stock.
6C/84	Dead Weight Testers, 1-300 lb.
37J/251	Vacuum Pump, Type B3.
37J/263	Lockheed Hydraulic Pump.

A.G.S.
Light Alloy Bolts and Nuts

A17/8B	Bolt L/A, 4BA x .8in. Plain shank.
A17/3C	Bolt L/A, 2BA x .3in. Plain shank.
A17/7C	Bolt L/A, 2BA x .7in. Plain shank.
A17/1E	Bolt L/A, ¼in. BSF x .1in. Plain shank.
A18/AP	Nut L/A, 6BA. Plain hexagon.
A18/BP	Nut L/A, 4BA. Plain hexagon.
A18/ES	Nut L/A, ¼in. BSF. Slotted.
A18/JS	Nut L/A, ⅜in. BSF. Slotted.

SPECIAL ANNOUNCEMENTS

Stainless steel welding rod, American manufacture: "Rezistol Armorized Coated," Type 310, D.C. ⅛in. dia. A large quantity available. Your inquiries are invited.

We offer a quantity of American manufactured runway approach lights, Type W.P.

100 sheets of unreleased stainless steel to Spec. D.T.D. 166, 18 SWG x 6ft. x 2ft. We welcome your inquiries.

WANTED

PERSPEX ASTRO DOMES. MUST BE IN GOOD CONDITION AND C/W FITTINGS. AS FITTED TO ANSON, LANCASTER, HALIFAX, ETC. WE WOULD BE PLEASED TO RECEIVE YOUR OFFERS AT OUR HEAD OFFICE.

All inquiries for any of the above items, or items not shown, to our Sales Department at:—

15 Gt. Cumberland Place, London, W.1

Telephone: AMB. 2091 (5 lines). *Telegrams:* "AVIATRADE, WESDO," LONDON. *Cables:* AVIATRADE, LONDON.

THE BRITISH AVIATION INSURANCE COMPANY LIMITED

UNDERWRITER & PRINCIPAL SURVEYOR

CAPT. A. G. LAMPLUGH
C.B.E., FRAe.S., M.IAe.E.

HEAD OFFICE

3-4 LIME STREET, LONDON, E.C.3

Telephone: Mansion House 0444

BRANCH OFFICES

MONTREAL	JOHANNESBURG	VANCOUVER
276 St. James Street West, Tel: Lancaster 6135	London House, Loveday Street, Tel: 33-3048	626 West Pender Street, Tel: Tatlow 2167
TORONTO	**CALCUTTA**	**BRUSSELS**
145 Yonge Street, Telephone: Adelaide 3221-2	2 Hare Street, Telephone: Bank 6237	99 rue de la Loi, Telephone: 123965

Jubilee

EITHER IT IS — *or it isn't!*

JUBILEE has been our registered trade name for 30 years, and may not be used to describe any other clip.

THE FINEST CLIP in the world

L. ROBINSON & CO., (GILLINGHAM) LTD., London Chambers GILLINGHAM, KENT. PHONE 5282
L32625

Teddington **FARNBOROUGH PREVIEW**

HOT AIR VALVE WITH 3 in. GATE

This is a general-purpose isolation valve for use in hot-air systems. It will work at temperatures up to 350° C. and against pressures up to 150 p.s.i. Under these conditions it provides a shut-off valve with a leak rate of less than 1 cu. ft./min. It is available in forms to suit all installations and the high temperature integral actuator can be supplied with a range of speeds without change of physical dimensions.

Teddington AUTOMATIC CONTROLS

Teddington

TEDDINGTON CONTROLS LTD., CEFN COED, MERTHYR TYDFIL, SOUTH WALES. Merthyr Tydfil 666.

VF

from

GHOST *to* GALLEY

Firth-Vickers have been working on the problems involved in the **COMET** for over fifteen years and have been associated with the development of the Ghost Engine since its prototype days.

FIRTH - VICKERS

CORROSION, HEAT & CREEP-RESISTING STEELS

Telephone No: Sheffield 42051

FLIGHT
and
AIRCRAFT ENGINEER

PRESS DAY — *Classified advertisement "copy" should reach Head Office by* FIRST POST THURSDAY *for publication in the following week's issue subject to space being available.*

CLASSIFIED ADVERTISEMENTS

Advertisement Rates. 4/- per line, minimum 6/, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders 5/- per line, minimum 10/-. Each paragraph is charged separately, name and address must be counted. All advertisements must be strictly prepaid and should be addressed to FLIGHT Classified Advertisement Dept., Dorset House, Stamford Street, London, S.E.1.

Postal Orders and cheques sent in payment for advertisements should be made payable to Iliffe & Sons, Ltd. and crossed & Co.

Trade Advertisers who use these columns regularly are allowed a discount of 5% for 13, 10% for 26 and 15% for 52 consecutive insertion orders. Full particulars will be sent on application.

Box Numbers. For the convenience of private advertisers Box Number facilities are available at an additional charge for 2 words plus 1/- extra to defray the cost of registration and postage, which must be added to the advertisement charge. Replies should be addressed to "Box 0000, c/o Flight," Dorset House, Stamford Street, London, S.E.1.

The Publishers retain the right to refuse or withdraw advertisements at their discretion and do not accept liability for delay in publication or for clerical or printer's errors although every care is taken to avoid mistakes.

Situations Vacant. The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service etc. if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

Whilst stocks last take advantage of this exceptional value offer of AIR CREW

ANTI-GLARE SPECTACLES

Safeguard your sight—prevent eye strain. Invaluable to Motorist, Aviator, Angler and for all outdoor pastimes. Brand new. Comfortable to wear. Heavily nickelled frame fitted with optically ground tinted lenses. Note the remarkable low price. Complete with case **21/-** **17/6**

Mark VIII **GOGGLES complete with spare pair of tinted lenses.** Original R.A.F. finish. Spare pair of lenses tinted or clear, **7/6.** **22/6**

OCTOPUS mask-type flying goggles, extra large curved safety lenses **22/6**

Terms to Flying Clubs. Trade Supplied. Send 3d. in stamps for illustrated catalogue.

D. LEWIS LTD. (Dept. F)
Leather Clothing Manufacturers for Home or Export
124 GT. PORTLAND ST., LONDON, W.1
Tel.: Museum 4314. Grams.: Aviskit, Wesdo, London.

DAKOTA SPARES

Undercarriages—all parts available.
Wheels complete.
Exhaust Collector Rings complete.
Exhaust Tail Pipes, Brake Drums.
All for immediate delivery ex stock.

Staravia
BLACKBUSHE AIRPORT
CAMBERLEY, SURREY
Tel.: Camberley 1600

WOLVERHAMPTON AVIATION LTD.

THE LEADING LIGHT AIRCRAFT ENGINEERS. THE AIRPORT WOLVERHAMPTON

tel. FORDHOUSES 2228

AIRCRAFT SPRING WASHERS

TO B.S. SPECIFICATION S.P.47

(ROSS MFG. (1938) LTD., COMBE DOWN, BATH

AIRCRAFT FOR SALE

W. S. SHACKLETON LTD.
FOR CIVIL AIRCRAFT OF EVERY DESCRIPTION
★
FOR PURCHASE OR SALE IN ANY PART OF THE WORLD
★
FOR QUOTATIONS DELIVERED C.I.F. BY AIR OR SEA
★
FOR ANY AERONAUTICAL INQUIRY write to
Europe's largest aircraft dealers
W. S. SHACKLETON LTD.
(20 years at this address—121 different types of aircraft sold)
175 PICCADILLY, LONDON W.1.
Phone: Regent 2440-9.
Cables: Shacknud, London. [0070

FIELD AIRCRAFT SERVICES, LTD.,
offer
COMPREHENSIVE AIRCRAFT SERVICE
Please send your inquiries to:
FIELD AIRCRAFT SERVICES, LTD.,
CROYDON AIRPORT, SURREY
Phone: Croydon 7777. Cables: FIELDAIR, Croydon. [0258

R. K. DUNDAS, Ltd.

IN these columns we successfully forecast the result of the last General Election. But, our crystal being rather hazy at the time of going to press, we are keeping to ourselves the 1st, 2nd, 3rd and 4th in the Daily Express Air Race at Shoreham, for the time being. As many of the competing aircraft were sold by or through us at one time or another it is, however, safe to say . . . No! Nothing is safe in this business. Anyway, we congratulate everybody concerned and assure our regular readers that the crystal shall speak clearly again before long.

R. K. DUNDAS, Ltd., 29, Bury Street, London, S.W.1.
WHI. 2846. Cables: "Dundassero, Picc, London."

CROYDON AIRPORT. CRO. 7744. [0255

AEROSERVICES (LONDON), Ltd.

DE HAVILLAND Dove—a further aircraft ready soon, completely overhauled with 12 months C. of A. SEND your enquiries for all types of aircraft to:
46, Hertford Street, Park Lane, London, W.1.
TEL.: GROsvenor 8363.
CABLES: Aeropaul, London. [0040

DARLINGTON & DISTRICT AERO CLUB have for sale: PROCTOR III. Long-range tank, 4 seats. C. of A. valid till December, 1952.
AUSTER Autocrat, 12 months C. of A. Long-range tank and starter.
AUSTER Autocrat. Long-range tank and starter. C. of A. expired.
MAGISTER Aircrafts. C. of A. expired.
ALSO full range of Magister spares.
DARLINGTON & DISTRICT AERO CLUB, 41 Blackwellgate, Darlington. Tel. 5307. [0027

MILES Gemini. 75 hours since complete overhaul. £1,100. Southern Aircraft (Gatwick) Ltd. [0034

FOR SALE Dakotas, Anson, Whitney Straight. Starways, Liverpool Airport. [0032

£420 AUSTER AUTOCRAT. C. of A. till May 1953. Perfect condition.—Elliott, 61, Farrer St., Middlesbrough. [0030

STINSON Reliant, 4-5 seater, Lycoming engine, fitted radio, long-range tanks, full blind flying instruments. £1,000 or exchange for cabin cruiser or modern car.—Southern Aircraft (Gatwick), Ltd. [0023

TWO Sandringham Mk. VI Flying Boats in excellent condition, low flying time, with airframe spare parts, spare engines, spare propellers and ground equipment for sale. Immediate delivery.
FOR price and terms please apply to:
SCANDINAVIAN AIRLINES SYSTEM, Region Norway, Oslo. [0026

REQUIRED IMMEDIATELY BY WELL KNOWN AUTOMOBILE ENGINEERING FIRM IN NORTH WEST DISTRICT

Designers and Detail Draughtsmen, Jig and Tool Draughtsmen—also Planning Engineers

THESE VACANCIES OFFER GOOD CONDITIONS AND PROSPECTS TO SUITABLE APPLICANTS. SALARY ACCORDING TO AGE, EXPERIENCE AND QUALIFICATIONS

Apply Box No. 8013, *c/o Flight*

FLYING TRAINING TO HIGHEST MODERN STANDARDS FOR

Private and Commercial Pilots' Licences Instructors' Rating

TIGER MOTH & AUSTER £3 per hour
NIGHT FLYING - - - £4 per hour

Contract Rates on Application
Ministry of Civil Aviation Approval
MARSHALL FLYING SERVICES LTD.
THE AERODROME, CAMBRIDGE
Tel.: CAMBRIDGE 56291

Bring Competitive Prices into the Disposal of Your AIRCRAFT or SPARES. SALE by AUCTION and/or PRIVATE TREATY will assure your obtaining the Highest Price.
Full particulars of our Services. Write, phone or Cable
KENNEDY, SON & PARTNERS
Auctioneers and Surveyors.
GATWICK AIRPORT, HORLEY, SURREY
Telephone, Horley 1510, ex 15.
Free entry on our disposal list open to all owners, without obligation or engagement.

COTTON BAGS

FOR SPARE PARTS, etc.

WALTER H. FELTHAM & SON, LTD.
Imperial Works, Tower Bridge Road,
Telephone: HOP 1784 **LONDON, S.E.1**

AIRCRAFT FOR SALE

MILES GEMINI; airframe and engine hours low; 13 months C. of A.; 6-channel Pleasey; interior grey leather; full equipment. Immediate delivery. Others.—Lonhams Flying Services, Ltd., Blackpool Airport. [0000

MILES GEMINI; airframe and engine hours 500 since new; 12 months C. of A.; interior grey leather. Full equipment. Immediate delivery. Others.—Lonhams Flying Services, Ltd., Blackpool Airport. [0001

AEROCONTACTS, Ltd., leading distributors of new and used aircraft. Large stocks held at Gatwick for immediate inspection and early delivery. Specialist stockists of D.H. Dragon Rapides. "Aerocontactalogue" free on request.—Gatwick Airport, Horley 1510. [0000

AIRCRAFT WANTED

AUSTER Mk 5 (Lycoming engine), or similar aircraft. Current C. of A. Long-range tank preferable. Wireless not required. Must be cheap. Box 1820. [0519

WANTED, Miles Mercury, with or without C. of A. Full particulars and price to Keystone Garage Ltd., Exeter Road, Bournemouth. [0513

AUSTER AUTOCRAT in good condition with low airframe and engine hours, long-range tank, blind-flying panel, starter, required by private buyer.—Full details to Box 1694. [0520

AIRCRAFT ACCESSORIES AND ENGINES

£25 Pair Autocrat wings slightly damaged but stripped for inspection, also tail unit and other parts cheap.—Manager, Airport, West Hartlepool. [0537

WOLVERHAMPTON AVIATION, Ltd., offer a Rapide 18-gallon long-range fuel system with complete kit and drawings, also large stocks of propellers, type L.A. 506/3. Enquiries invited. [0496

VENDAIR, Croydon Airport, have in stock an extensive range of propellers, engines, instruments and airframe spares for British aircraft. All inquiries to the Spares Department, Vendair, Room 51, Croydon Airport, Croydon 7744. [0000

AIRCRAFT SERVICING

CRACK detection by Magna Flux. A.R.B. Certificate of Compliance coverage for aircraft parts. Prompt service; reasonable charges.

C. & S. AIRCRAFT, Blackbushe Airport, Camberley 1800 (Extn. 307). [0510

BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge. C. of A. overhauls, modifications and conversions. Tel.: Byfleet 436. [0000

REPAIRS and C. of A. overhaul for all types of aircraft. —Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel. Moulton 3248. [0087

CARAVANS

A CARAVAN from U.K.'s most stupid distributor?

A FOOL who has advertised daily and nationally for 10 years that he gives U.K.'s only unconditional guarantee with free-van-lent for a leaky one and all repairs free for a year at least and who has U.K.'s largest selection. (See two pages of advertisement in *The Caravan* each month). A fool who has paid thousands of his own money to support the £3,000 per annum loss-making Caravan Residents' Association, a fool who gives free delivery over 60 miles, a fool who sells only reliable makes including all well known N.C.C. approved van makes (Berkeley, Rodles, Thomson, Rollalong, Raven, etc., often at reduced prices, and still gives free delivery!). A fool who will sit down on a little Kingside lot and sell 2 vans a week instead of 40 with one fiftieth of the trouble and more profit! Unfortunately he likes his business which is his life. Good n.h.p. terms. He has 1 lb. of advice articles and brochures free to those who would like to write to Dept. F., Taplow, please. A. S. Jenkinson, Limited (Our Equal selection—London Branch), 80, Oxford Street, London, W.1 (Corner of Rathbone Place). Tel.: Langham 5606-7. Two minutes from Tottenham Court Road Tube Station. Open till 8 p.m. seven days a week. Also at Bath 3204, Taplow, Bucks. Tel.: Burnham 3434-5-6. Always open. Easy to reach—right on Main A.4. Outskirts Maidenhead. Taplow Station 4 mins. Now open: Hammersmith Branch (corner of Sussex Place and Hammersmith Bridge Road W.6.). One minute Hammersmith Broadway. Open till 8 p.m. every day. [0000

NEW "Statesman," £1,065. Other Berkeleys from £360/10/-. New Glider 4-berth de luxe, £399/10/-, and 2-berth, £212. Safari, £365. Towing. Hire purchase.—Mantles Garages, Ltd., Biggleswade. Tel. 2113. [0097

CLOTHING

R.A.F. and R.N. officer's uniforms purchased; large selection of R.A.F. officers' kit for sale, new and reconditioned.—Fisher's Service Outfitters, 93-96, Wellington St., Woolwich. Tel.: Woolwich 1055. [0507

CLUBS

REDHILL FLYING CLUB.

LEARN to fly at Redhill Aerodrome, Surrey. South of London's nearest flying centre, 23 miles from Hyde Park Corner. £2/10/- per hour dual from £2/10/- solo; instrument flying, instructors' and advanced courses. Attractive clubhouse with full catering facilities.—Tel.: Nutfield Ridge 2246. [0347

LEARN to fly at Elstree Flying Club. M.C.A. approved L 30-hour courses. Three gulineas per hour.—Tel.: Elstree 3070. [0314

HERTS and ESSEX AERO CLUB, Broxbourne Aerodrome, Nazeing, Essex. M.C.A. approved 30-hour course; solo flying from £6/- per hour; residential; trial lessons, 30/-; train from Liverpool Street, or Green from Coach 715. Tel.: Hoddesdon 2453, 2431, 3708. [0000

PLYMOUTH AND DISTRICT AERO CLUB for Auster and Tiger Moth flying instruction; dual and solo at £3 per hour, reducing to less than £2 per hour for solo flying on "Fly Yourself Hire" basis; flying instructors' courses and M.C.A. approved course for private pilot's licence.—Tel.: Plymouth 72701. [0041

CONSULTANTS

WING COMMANDER R. H. STOCKEN, R.Ae.S., Eagle House, 109, Jermyn St., London, S.W.1. Tel.: Whitehall 8063. [0419

CANADA-Gt. Britain Liaison service. Technical and Sales. Personal contact.—W. P. Dunphy, Consulting Air Engineer, Montreal Airport, Montreal, Canada. [0340A

HANGARS

FOR SALE, Hangar (all steel). 113ft clear span x 136ft long x 26ft clear height at eaves, rising to 38ft clear at apex. Doors each end (grable optional).

STEEL building 111ft 6in. span over frames (101ft 4in. clear) x 216ft long x 16ft (extensible to 26ft) to eaves. Large doors in sides or ends as required.

HANGAR (all steel), 80ft clear span x 144ft long x 22ft clear height at eaves, rising 32ft at apex. Doors one end.

STEEL building 80ft clear span x 144ft long x 22ft clear height at eaves. Large sliding doors in sides.

CURVED steel building 36ft span x 17ft 6in. high at apex. Up to 600ft long (low price).

BELLMAN HANGARS, Ltd., Terminal House, London, S.W.1. [0451

FLYING MOUSETRAPS

As Emerson says: "If you can make a better mousetrap than any other man, the world will beat a path to your door."

We of AEROCONTACTS do not offer mousetraps, but we DO offer a world-beating supply service for purchasers of aeronautical Radio and Electrical installations and components, instruments and, of course, airframe spares—products of British skill.

The path to our door is well-worn and ever widening as more and more of our clients come to realise the advantages of purchasing from our enormous stocks of fully certified aircraft accessories which cover the complete range of engine, flight, test and navigation instruments.

One of the main advantages, of course, is that of being able to purchase the whole of your requirements from one source rather than placing orders with a hundred-and-one different manufacturers. The consumer then has the infinite pleasure of leaving his complete procurement headaches in the hands of our Sales Department. A very important consideration, of course, is that of price and, on account of our system of bulk purchasing, we are able to offer the most competitive prices consistent with high technical standards. Then again, our delivery dates are the very shortest that can possibly be offered; that is, if the goods are not already in our Bonded Stores ready for immediate despatch.

Finally, there is the matter of Personal Service right through from the moment the first contact is made by letter or by 'phone to the time that the goods are despatched from our premises—your business is conducted exactly as you would demand were you on the spot to see to it yourself.

Our various sales departments are always at your service, always ready to bring you a rapid solution to current problems, always happy to give you advice as to the exact item to suit the job in hand.

As we have already said, the path to our door is well-worn and ever widening so that, fortunately, our friends do not need to make strenuous efforts to get in touch with us. A telephone call, a cable or a letter will always bring prompt and courteous attention to your requirements however minor or major they may be.

INSURANCE

ALL types of aircraft insurance and personal accident cover.—Apply to J. W. T. Amery, Messrs. R. J. Mould and Co., Percy House, 796, High Rd., Tottenham, N.17. Tel.: Tottenham 2003-4-5. [0004

PACKING AND SHIPPING

R. AND J. PARKS, Ltd., 143-9, Fenchurch St., E.C. Tel.: Mansion House 3383. Official packers and shippers to the aircraft industry. [0012

RADIOS

IF you want to sell your aircraft radio equipment, why not contact Aerocontacts, Ltd., Gatwick Airport. Tel.: Horley 1510, Ext. 39. [0007

TUITION

DON'T PRESS ON REGARDLESS!
DON'T PRESS ON REWARDLESS!
Try

AVIGATION, LTD.

(the safe guidance and handling of aircraft in the air) who offer the best presentation and most up-to-date courses (planned and produced in 1952 with colour illustration) for the M.C.A. Pilots and Flight Navigators Licences; very moderate charges, no further text books, all papers marked, guidance answers supplied, AND are giving unparalleled results. Postal and Direct Tuition available. Write today for brochure and sample lesson, 20, Central Chambers, Ealing, W.5. (Ealing 0949). [0348

LONDON SCHOOL OF AIR NAVIGATION (1949), LTD.

PERSONAL coaching for Commercial Instrument Rating, Senior Commercial, A.L.T.P. (conversion thereto) and Flight Navigator licences. This school provides the most rapid and economical method of qualifying I.C.A.O. standards.

COMPLETE "Study-as-you-work" courses. Stimulates classroom instruction; lessons, questions, model answers. Unique in application, ideal those employed or seeking career from Services.

LINK instruction and R/T for all instrument rating procedures. Any form of flying training at best quotations. Brochure with terms: 10, Ailing Street, London, W.6. Tel.: 7900. [0077

AIRCRAFT engineer, "A" and "C" licences. Two-year approved courses.

COMMERCIAL pilots and A.L.T.P. technical instruction for general and type rating, conversions, etc.

DIPLOMA course combines full day workshop and technical training for executive appointments.

SYLLABUS (state department) from Engineer-in-Charge, College of Aeronautical and Automobile Engineering, Chelsea, Fla. 0021. [0018

LEARN to fly for £36; instructors' licences and instrument flying for £5 an hour; night flying £3/10/- an hour, residence 5 gns. weekly. Approved M.C.A. private pilot's licence course.—Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants. [0053

A.F.R.Ae.S., A.M.I.Mech.E., etc., on "no pass, no fee" terms; over 95% successes. For details of exams and courses in all branches of aeronautical work, navigation, mechanical eng., etc., write for 144-page handbook free.—B.I.E.T. (Dept. 345D), 17, Stratford Place, London, W.1. [0707

FREE! Brochure giving details of courses in all branches of aeronautical eng., covering A.F.R.Ae.S., M.C.A. exams, etc. We are the only postal training college operated by an industrial organization.—Write to E.M.I. Institutes, Postal Training Division, Dept. 75K, Grove Park Road, London, W.4. (Associated with H.M.V.). [0038

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL, Essex. Tel.: Rochford 56304. Comprehensive training for private, commercial licences and instructor's endorsements. M.C.A. approved for 30-hour course, Tiger Moth and Auster aircraft fitted with radio. Special facilities for training in instrument ratings. Hourly rates: solo, day £3, night, £4. Dual 5/- extra. Contract rate £2/10/-. Link trainer 10/-. No fees or subscriptions. Trial lesson, 30/-. [0332

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

HANDLEY PAGE, Ltd., have vacancies for:—

AERODYNAMICISTS of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

STRESSMEN of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

SENIOR, design and intermediate draughtsmen, preferably with aircraft experience, for Cricklewood and Radlett offices. Consideration will be given to applicants with experience in light structural or mechanical engineering. Possession of O.N.C. or H.N.C. (Mech. or Elect.) an advantage.

WEIGHT control engineers, with O.N.C. (Mech.). Previous experience preferred.

TECHNICAL assistants of degree or H.N.C. (Elect.) standard for the design and development of aircraft electrical systems. Previous experience preferred.

SENIOR and junior assistants of degree or H.N.C. standard for the Mechanical and Structural Test Dept. at Radlett.—Write, stating age, qualifications and details of experience to Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. [0321

OVERSEAS appointment, radio officer.

A VACANCY exists for a radio officer in Tripoli, the Lebanon. Minimum qualification is first-class P.M.G. SALARY £725 by £25 to £825. Expatriation allowance £300 per annum, separate local allowance payable in local currency according to marital status of successful applicant.

CONTRACT. Two years contract with three months home leave on completion. Preference given to bachelor. Alternatively a married man prepared for one years' separation from his family.

FURTHER details will be given at interview on application in writing to Aircrew Superintendent, Airwork Ltd., Blackbushe Airport, nr. Camberley, Surrey. [0020

WANTED, "C" licensed engineer, with endorsement for Pratt and Whitney.—Write, Box 1695. [0333

LICENSED and unlicensed engine fitters required by Air Enterprises, Ltd., both at Croydon and Renfrew. Good rates of pay and bonus. [0034

WANTED, A.C. and X. licensed aircraft engineers familiar with types of light aircraft for the West Midlands area. Apply, Box 1712. [0495

LICENSED radio engineer and radio mechanics at our bases at Stansted Airport, Essex.—Apply by letter or telephone to the Senior Radio Engineer, Aviation Traders, Ltd., Southend Airport, Essex. Tel.: Rochford 50491. [0000

SITUATIONS VACANT

D. NAPIER & SON, Ltd., Luton Airport, Beds., invite applications for the following posts:

DRAUGHTSMEN. Power Plant section. Three senior and three detail draughtsmen. Ref. DPP. Flight test section. One senior and two detail draughtsmen. Ref. DPT. Electrical section. One senior electrical and two detail draughtsmen preferably with a bent towards electrical and radio installations. Ref. DE.

PROJECT office designers. Two senior project designers. With aerodynamics and stressing experience. Some knowledge of rocket motor design practice an advantage. Ref. PJD.

DESIGN study. Two technical assistants, with knowledge of applied aerodynamics and aircraft performance estimation. Some knowledge of rocket motor performance and assisted take-off devices an advantage. Ref. DS.

AERODYNAMICS. Two technical assistants, one a senior and one junior for work on general aircraft problems and guided weapons. Supersonic experience desirable. Ref. AD.

ROCKET motor development. Three technical assistants (A of degree or Higher National Standard). One junior technical assistant for film analysis and computing from rocket motor test results. Ref. RMD.

ROCKET motor project analysis. Two senior technical assistants (thermodynamicists) for rocket motor project investigations. Some experience of high-speed pumps and turbines an advantage. Degree standard necessary. Ref. RMPA.

RAMJETS. One senior technical assistant (thermodynamicist) of engineering degree standard for work on ramjet investigations. One computer (male or female) of at least matriculation standard. Ref. RJ.

FUEL metering. Two senior technical assistants for work on fluid control and metering problems, with experience on aircraft and/or ramjet fuel systems. Engineering degree or H.N.C. essential. Ref. FM.

POWER plant development. Two engineers with experience in turbine and piston engines (theory and practice). Engineering degree or H.N.C. essential. Ref. PPD.

STRUCTURES section. One technical assistant for work on experimental vibration testing and analysis of guided weapon and aircraft structures. Degree or H.N.C. essential. One technical assistant for structural testing and development. Experience in stress analysis and degree or H.N.C. essential. Ref. SS.

RIG testing. One mechanical assistant with engineering apprenticeship and at least O.N.C. Some experience of test rig operation necessary involving fluid control and measurement. Also one electronic wireman and one aircraft fitter to assist with de-icing investigations. Ref. RT.

INSTRUMENT shop. Two electronic assistants, familiar with C.R.O. practice, for instruments laboratory. Instrument shop foreman to take charge of small experimental shop. Instrument maker with experience of aeronautical instruments for engine flight test. Ref. IS.

FLIGHT development. Senior technical assistant for flight development testing of experimental engines, preferably degree in mechanical engineering or at least H.N.C. with similar previous experience on gas turbines or aero engine development. Junior technical assistant with similar qualifications and apprenticeship in engineering. Four male or female computers. Ref. FD.

STRESS section. Two aircraft stressmen required for work on interesting problems, in connection with aero engine installations. Applicants must have at least five years experience in aircraft stressing and education to H.N.C. standard. Ref. AS. Accommodation available for single men immediately—all possible assistance given to married applicants.

APPLY with fullest possible particulars of age, experience, qualifications and salary expected to your local Employment Exchange, quoting in all cases the Reference letters for the particular applications. [9454

THE following vacancies exist in an engineering organisation situated in S.W. Middlesex.

1. Senior development engineer for design and development work on a.c. synchros and/or small a.c. servo motors. B.Sc. or equivalent and previous experience essential. Salary according to age and experience.

In reply please quote Ref. 7/EN.

2. Development engineer for design and development work on moving coil instruments for aircraft. B.Sc. or equivalent and experience in the design and manufacture of magnetic systems essential. Knowledge of aircraft design requirements an asset. Salary according to age and experience. In reply please quote 8/EN.

HOUSING assistance will be given to successful candidates.—Write: Personnel Manager, S. Smith and Sons (England) Ltd., Bishops Cleeve, Glos. [9537

PORTSMOUTH AVIATION have vacancies for stressmen of all grades for super-priority work at Portsmouth and Hurn Airports.—Apply: The Airport, Portsmouth. [9151

NORMALAIR, Ltd., Yeovil, invite applications from the following for work in connection with the aircraft air-conditioning, pressurising and high-altitude breathing equipment:—

DRAUGHTSMEN.
TECHNICIANS.
TECHNICAL WRITERS.

APPLICATIONS, stating age, experience and salary required, should be addressed: Employment Exchange (N.A.), Yeovil. Local interviews will be arranged where convenient. [9374

SENIOR design draughtsmen required. Aircraft experience essential. High salaries (above A.E.S.D. rates) for top-grade men.—Write full details in confidence to Miss. Dir., Microcell, Ltd., 56, Kingsway, W.C.2. [9535

AIRCRAFT leaving U.K. for India early September. Ferry pilot wanted who would not require return passage. Only very experienced pilots apply to Box 1997. [9060

INSTRUMENT repairers required for Bovingdon Airport Unit. Overhaul exp. of air-driven gyro equipment, elec. gyro and fluxgate compasses an asset. Good pay and conditions.—Apply: Personnel Officer, Fields of Croydon Airport, Surrey, after August 18th. [9539

WYNSTRUMENTS, Ltd., have vacancies for instrument engineers with first-class experience in the overhaul of Gyro Instruments.—Apply in the first case by letter, addressed to the Chief Inspector, Wynstruments, Ltd., Staverton Aerodrome, Gloucester. [9510

JIG and tool draughtsmen, fully experienced, required by Percival Aircraft, Ltd., Luton Airport, Beds. Good working conditions and full welfare facilities, including staff pension scheme.—Applications to the Manager, Luton Employment Exchange, stating age, experience, salary required. [9606

LOFTSMEN required, previous aircraft experience not essential. Apply Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey. —Applications, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. [9460

DOWTY EQUIPMENT LIMITED

require first class sound

PRACTICAL ENGINEERS

preferably with some experience of design development and testing of jet engine accessories, particularly flow, acceleration and speed governing controls, burners and pumps. Exceptional prospects of advancement.

SENIOR DRAUGHTSMEN

required for development work on fuel systems. Experience on light hydraulic or pneumatic controls acceptable. Important positions with prospects.

The Company's conditions are exceptionally good; there is a realistic pension scheme and the environment is ideal.

The Company employs a Housing Officer who will render every assistance.

Write, preferably in tabulated form, to

PERSONNEL MANAGER,
DOWTY EQUIPMENT LTD.
Arle Court, Cheltenham.

THE DE HAVILLAND AIRCRAFT CO. LTD.

have vacancies for

SENIOR AND INTERMEDIATE DESIGN DRAUGHTSMEN in their HATFIELD and LONDON OFFICES

Men with experience in

STRUCTURES DESIGN
MECHANICAL DETAILS
ELECTRICAL INSTALLATIONS
are invited to apply

Aircraft experience preferred but applications will be considered from men experienced in light Mechanical Engineering or Wiring Layouts, Design of Electrical Junction Boxes, etc.

Large programme of work on CIVIL JET AIRLINERS AND MILITARY AIRCRAFT

Apply in writing to

The Chief Draughtsman,
THE DE HAVILLAND AIRCRAFT CO. LTD.,
Hatfield, Herts.

Applications are subject to approval of Ministry of Labour and National Service

SITUATIONS VACANT

MINISTRY OF SUPPLY. Principal scientific officer and senior scientific officer. The Civil Service Commissioners invite applications for permanent appointments at a Ministry of Supply experimental flying establishment near Salisbury for the following posts:

POST A. Principal scientific officer. To control staff engaged mainly in research and development of flight-testing methods and techniques. An engineer or physicist with mathematical ability or an applied mathematician with a practical outlook is required with a thorough knowledge of aerodynamics and several years' experience in aeronautical research. Experience or interest in helicopter flight test development would be an advantage.

POST B. Senior scientific officer. To undertake theoretical and analytical work on the development of helicopter testing techniques and general research on helicopter flight problems. An engineer physicist or applied mathematician with some experience in aeronautical research is required.

CANDIDATES must possess a first- or second-class honours degree in mathematics, physics or engineering or equivalent qualification and at least three years' post-graduate research experience.

THE Commissioners may, at their discretion, admit a candidate of high professional attainment notwithstanding that he or she may not possess these qualifications.

CANDIDATES must have been born on or before December 31st, 1926, but the senior scientific officer post (and similarly graded scientific posts in other Government departments) is also open to candidates born between January 1, 1922, and December 31, 1926 (inclusive) through the open competition already announced (No. S 53/52).

SALARY scales: Principal scientific officer: men £1,039 to £1,377; women £807 to £1,216. Senior scientific officer: men £781 to £980; women £649 to £975.

EXCEPTIONALLY a starting salary above the minimum may be granted according to qualifications and experience.

Posts are pensionable.

FURTHER particulars and application forms from the Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. S 43/52.

COMPLETED application forms must be returned by December 24th, 1952. [9393

WEIGHT estimator required by Percival Aircraft, Ltd., Luton Airport, Beds, for work on fixed wing and helicopter aircraft. Good welfare facilities, including staff pension scheme.—Apply, giving details of age, qualifications, experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. [0362

H. MORSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouse, Wolverhampton. [9420

LANCASHIRE AIRCRAFT CORPORATION, Ltd., Bovingdon Airport, Herts, require qualified pilots, navigators and radio officers for their York fleet. Only applicants holding appropriate M.C.A. licences will be considered.—Please write full details to the Personnel Manager, at above address. [0280

AIRCRAFT control officer required. Applicant should have previous experience of operating VHF/DF equipment and be prepared to learn operation of radar approach unit. Salary in accordance with M.C.A. operator I Scale, plus bonus when proficient.—Applications to the Manager, Municipal Airport, Southend-on-Sea. [9393

SENIOR design and intermediate draughtsmen with good experience of aircraft or light structural or mechanical engineering required for aircraft and armament project work at Portsmouth and Hurn offices.—Apply by letter to Portsmouth Aviation, Ltd., The Airport, Portsmouth. [9391

AIR SCHOOLS, Ltd., require a qualified flying instructor with a minimum B.1. category, also one ex-flying instructor qualified to instruct on applied flying subjects. —Applications to be addressed to the Chief Instructor, Air Schools, Ltd., Derby Airport, Burnaston, nr. Derby, giving fullest particulars of experience. [9488

SENIOR jig and tool draughtsmen, capable of designing with minimum supervision tooling equipment for producing aircraft components. Workshop background essential. Advancement according to ability. Canteen, five-day week and good travelling facilities.—Write with particulars, to Personnel Manager, Boulton Paul Aircraft, Co., Ltd., Pendeford, Wolverhampton, Staffs. [9532

FLYING instructor wanted, must be capable of managing and supervising all phases of flying-club activities. Excellent opportunity to build up flying and social membership of Newfoundland Flying Club, St. John's, Newfoundland. Address enquiries to: Royal Canadian Flying Clubs Association, 306, Journal Building, Ottawa, 4, Canada, stating age, experience and qualifications. [9487

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience on design of test laboratory equipment desirable. Good welfare facilities, including staff pension scheme.—Applications, stating qualifications, experience, age and salary required, to Manager, Employment Exchange, Luton, Beds. [0299

TECHNICAL assistant. The Aircraft Design Technical Office of the Bristol Aeroplane Co., Ltd., have a vacancy for a junior or intermediate technical assistant in their engineering development laboratory. The work is concerned with the vibration testing of aircraft structures and mechanical systems on an interesting range of civil and military aircraft and helicopters.

CANDIDATES should possess a Higher National Certificate in Electrical engineering or equivalent qualification.

APPLICATIONS should be forwarded to the Ministry of Labour and National Service, 39, Nelson Street, Bristol, and marked for the attention of the Personnel Manager, The Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. [9489

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds, several draughtsmen with comprehensive experience of engine installations and allied systems. Good welfare facilities, including staff pension scheme.—Applications, in writing, stating age, qualifications, experience and salary required, to the Luton Employment Exchange. [0301

CHRISTCHURCH, Hants. Senior designing draughtsman required; experienced in power-plant installation. Must have jet installation design experience and capable of taking control of section under assistant designer. Saturday or Sunday interview can be arranged. Apply: Applications to Chief Draughtsman. The de Havilland Aircraft Co., Ltd., Airspeed Division, Christchurch, Hants. [9488a

CHRISTCHURCH, Hants. Applications are invited for a position as chemist to undertake general chemical and investigation work associated with aircraft structure. Training should have reached the degree standard with bias towards organic. Applications to Personnel Manager. The de Havilland Aircraft Company, Ltd., Airspeed Division, Christchurch, Hants. [9489

SITUATIONS VACANT

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers. —Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [9636]

ESTIMATORS (aircraft, male) required by Percival Aircraft, Ltd., Luton Airport, Beds. Fully conversant with general construction and preferably with previous experience in similar capacity. Good welfare facilities including staff pension scheme.—Applications, in writing, to the Manager, Employment Exchange, Luton, Beds., stating age, experience and salary required. [9473

MECHANICAL engineers holding degrees or with higher national certificate or associate membership of a recognised engineering institution, having served an apprenticeship, required by industrial concern in the West Midlands engaged on rocket motor development connected with guided weapon project. Applications to G.S.M. Box 1808. [9626

INTERNATIONAL AERADIO Ltd. require licensed radio maintenance engineer for overseas service. Salary from £962 18s. to £970 18s., plus adequate allowances according to location and marital status, tax free. Quarters provided or rent allowance paid. Paid U.K. leave, free passages, pension fund, kit allowance.—Please write quoting R.M.E. Personnel Officer, 40 Park Street, W.1. [9517

THE Aircraft Division of the English Electric Co., Ltd., at Warton Aerodrome, near Blackpool, requires an engineer interested in taking up flight observer duties. Applicants must have at least H.N.C. in aerodynamics. Salary commensurate with qualifications and experience.—Please write giving full details and quoting Ref. 1011 to Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London, S.W.1. [9501

ENGINEER or physicist experienced in radar is required for work in connection with flight trials of airborne and radar equipment. Degree or Higher National Certificate required. Experience of aircraft and flying desirable, but not essential. Apply in writing to the Staff Manager (Ref. GBLC/S/594), Research Laboratories of the General Electric Co., Ltd., North Wembley, Middlesex, stating age, qualifications and experience. [9415

GRADUATE in aeronautical or mechanical engineering is required for work concerned with stress calculations on mechanisms, gear trains and dynamically loaded light alloy structures, in an experimental research team at Stanmore. Apply to the Staff Manager, (Ref. GBLC/S/593), Research Laboratories of the General Electric Co. Ltd., Wembley, Middlesex, stating age, experience and qualifications. [9416

EXPERIENCED men (ex-Service radar mechanics preferred) are required for duties in the Electronics Division of Saunders-Roe Ltd. Applicants should be capable of intelligent assembly and wiring of a wide variety of electronic apparatus from circuit diagrams. Write, giving details of experience, age, etc., to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, Isle of Wight. [9514

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [9512

AIR FORCE. Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen and stressmen, for work on this interesting programme. Good welfare facilities, including staff pension scheme.—Write, giving details of experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. [9395

AIRCRAFT draughtsmen are required by the English Electric Co., Ltd., at Warton Aerodrome, near Blackpool. There are a number of vacancies for men having good aircraft drawing-office background. Good salaries will be paid according to age, qualifications and experience.—Write, giving full details and qualifications, and quoting reference "English Electric 1204," to Westminster Employment Exchange, Chadwick Street, London, S.W.1. [9408

BRITISH OVERSEAS AIRWAYS CORPORATION have vacancies for pilots who have attained Commercial Pilot's Licence with Instrument Rating and Radio Telephony licence. Preference will be given to applicants below the age of 37 years, but consideration will be given to suitably qualified applicants up to 50 years of age. Commencing salary dependent upon qualifications—£615 p.a. to £926 p.a.—Applications should be made in writing to the Chief Personnel Officer, B.O.A.C., Airways House, Great West Road, Brentford, Middx. [9500

AUTOMOBILE ENGINEERING FIRM OF REPUTE IN NORTH WESTERN AREA HAVE IMMEDIATE VACANCIES FOR DETAIL DRAUGHTSMEN BETWEEN THE AGES OF 21 AND 25 YEARS

THESE VACANCIES OFFER GOOD TERMS AND CONDITIONS, ALSO EXCELLENT PROSPECTS FOR RIGHT TYPE OF APPLICANTS

Apply immediately to Box No. 119 c/o Flight, giving as many particulars as possible regarding experience etc.

AIR LIAISON LIMITED

have pleasure in announcing that they can offer for sale the following C.47b Aircraft: All these machines are Passenger/Freighters with large type loading doors.

(a) G-AMPS, G-AMPT

Both aircraft are sound proofed, fully furnished, carpeted and are fitted with 32 new Pionair-type passenger seats. Colour scheme: grey and red with polished wood panelling.

AIRFRAME

G-AMPS	2,540 hours
G-AMPT	2,188 hours

ENGINES

Pratt and Whitney 1830/90D (G-AMPT one 1830/92)

	Port	*St'b'd.*
G-AMPS	143 hours run	144 hours run
G-AMPT	253 hours	Nil hours

PROPELLERS

	Port	*St'b'd.*
G-AMPS / G-AMPT	Nil hours	Nil hours

RADIO

Radio Compass R-S/ARN/7. Liaison Equipment BC.375E. Command H.F. Equipment. V.H.F. S.C.R. 522.

These aircraft are offered for sale with a 12-months' C. of A.

(b) G-AMSO, G-AMST

These two aircraft are offered unfurnished with a Permit to fly. Alternatively, they can be fitted to purchaser's specification fully furnished with 32 Pionair-type seats or 28 Pionair seats and larger baggage compartments, full radio, etc.

AIRFRAME

G-AMSO	1,986 hours
G-AMST	954 hours

ENGINES

Pratt and Whitney 1830/90D.

	Port	*St'b'd.*
G-AMSO	602 hours run	78 hours run
G-AMST	236 hours	316 hours

PROPELLERS

	Port	*St'b'd.*
G-AMSO	301 hours run	210 hours run
G-AMST	46 hours	952 hours

All inquiries in connection with these Aircraft should be made to the Sole Agents authorised by the Owners.

AIR LIAISON

29, CLARGES STREET, LONDON, W.1.

GROsvenor 6411.

SITUATIONS VACANT

AERONAUTICAL service engineer required. Duties will include installation, flight testing and servicing, for which a thorough practical and theoretical knowledge of a.c. and d.c. amplifier systems is required. A knowledge of electro-mechanical servo systems and synchronous transmission systems, would be an advantage. Preferential consideration will be given to applicants with previous electronic experience in possession of H.N.C. (or equivalent), or who have served a recognised engineering apprenticeship with subsequent experience in technical capacity. Must be prepared to travel. Position will be permanent and pensionable after qualifying period. Commencing salary £650 p.a. Apply with full details of age, qualifications and experience to Personnel Manager, Sperry Gyroscope Co. Ltd., Great West Rd., Brentford, Middlesex. [9638

SITUATIONS WANTED

RELEASED regular airman seeks employment in Germany (British or American zones) as an engine fitter. Specialised in servicing aero engines. Testimonials can be seen.—Box 1888. [9599

BOOKS, ETC.

"AIRCRAFT OF THE FIGHTING POWERS." Complete set of 7 volumes in mint condition, uncut. £13 15s.—Powell, 72 Dartmouth Park Hill, N.19. [9618

"YACHTING Quizmos," by Max A. Chappell. Packed with information on everything nautical from tides to trade winds, from sailing grounds to first aid. A book every enthusiast must read. 3/6 net from booksellers. By post 3/9 from Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1.

"CABE From Your Camera," by Arthur Nettleton, F.R.G.S. Shows how amateur photography can be made to pay for itself by the sale of pictures to newspapers, magazines, calendar publishers, etc., and deals with the many problems involved. 2nd edition. 7/6 net from all booksellers. 7/10 by post from Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1.

"TELEVISION in Your Home: Everything the Potential Viewer Needs to Know," by W. E. Miller, M.A.(Cantab.), M.Brit.I.R.E. An entirely non-technical guide for the ordinary viewer, providing everything he needs to know before and after the purchase of a receiver. 2/- net from all booksellers, 2/2 by post from Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1.

"MATERIAL Handling in Works Stores." By L. J. Hoekens. Shows how the use of fork-lift trucks and pallets in industrial stores can increase production, utilise floor space more effectively, help control of movement and reduce costs. Includes a description of a system actually operated in a modern factory. 10s. 6d. net from all booksellers. By post 10s. 11d. from Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1.

"PRODUCTION Engineering: Practical Methods of Production Planning and Control," by J. S. Murphy, A.I.I.A. Intended for students of production engineering and young planning engineers, the book deals with the various items of functions in factory organisation. Treatment is general rather than particular, and is concerned with basic principles that can be adapted to local conditions. Fully illustrated by 80 diagrams and photographs. 226 pages. Price 12/6 net. By post 13/-, from all booksellers, or the Publishing Dept., Dorset House, Stamford St., London, S.E.1.

GLOSTER AIRCRAFT CO., LTD.

HUCCLECOTE • GLOUCESTER

The following **VACANCIES** exist on progressive projects of advanced interest :—

STRESSMEN
Senior and Intermediate.

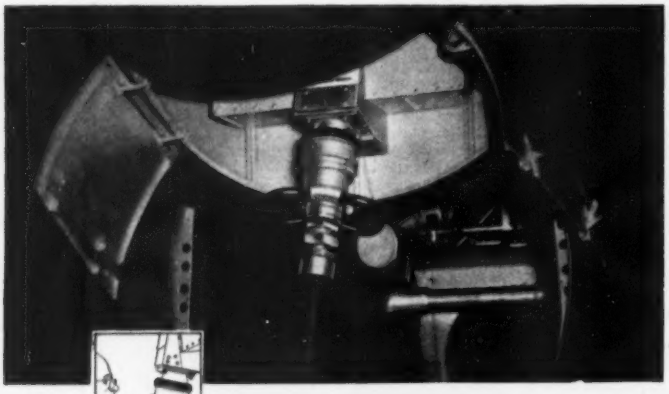
WEIGHTSMEN
Senior and Junior.

DRAUGHTSMEN
Structural and Electrical.

Previous aircraft experience an advantage but not essential

Prospects are excellent for energetic and sound applicants

APPLICATIONS to be addressed to the **CHIEF DESIGNER** giving particulars of **Experience, Age and Salary**



Chosen for Britain's Latest Aircraft

Avery-Hardoll

Fully interchangeable 3-point bayonet to N.A.S.-P-305 in accordance with International agreement reached with U.K., U.S. and Canada.

PRESSURE REFUELLING COUPLINGS

for *Ultra-rapid fuelling—with safety*

Technical details from

AIRCRAFT MATERIALS LIMITED

MIDLAND ROAD, LONDON, N.W.1 Tel.: EUSton 6151 (7 lines)

GUIDED MISSILES

The English Electric Company Ltd.

have vacancies for

(1) SENIOR STRESSMAN. This post offers an opportunity to a well qualified man with initiative and the ability to supervise stressing calculations. A minimum of three years experience on aircraft or missiles is essential and honours degree is desirable.

(2) STRESSMEN. Vacancies exist for both Senior and Junior stressmen and while some aircraft or missile experience is desirable, consideration will be given to applicants with experience in other industries.

(3) GRADUATE ENGINEERS/APPLIED MATHEMATICIANS. Honours graduates for advanced stress analysis investigations of a research nature are required. While aircraft or missile experience is an advantage, the primary qualifications are a good mathematical background and an enquiring outlook.

(4) AERO-ELASTICIANS. Technicians of degree standard are required for aero-elastic investigations. Previous work on aero-elastic problems is not essential, but past experience should include work on aerodynamics and/or aircraft structures, while a knowledge of supersonic aerodynamics is an added advantage.

(5) WEIGHT CONTROL ENGINEERS. A vacancy exists for a senior weight control engineer capable of not merely calculating weight breakdowns, but of actively chasing and controlling weights. Some aircraft or missile experience is essential. There are also vacancies for junior weight control engineers to assist in this work.

All the above posts offer unique opportunities to the right men in an expanding organisation.

Please write, giving full details and quoting reference S.A.25 with appropriate number to:

CENTRAL PERSONNEL SERVICES,
THE ENGLISH ELECTRIC COMPANY LTD.,
24-30 Gillingham Street, London S.W.1

Suppliers of machined and fabricated components in all Plastic and Allied materials to Britain's aircraft industry

Telephone: CLERKENWELL 2333/4 & 7247

UHLHORN BROS. LIMITED

Telegrams: UHLHORN, AVE, LONDON

ESTD. 1807

We are proud to have the pleasure of supplying our precision products to many of the leading British aircraft constructors

UHLHORN BROS. LTD.

53 CITY ROAD, LONDON, E.C.1

STEEL BUILDINGS for DISPOSAL

Structure. 100′ × 48′ × 14′ high.
Asbestos roof and sides. 6′ glazing in roof slopes.

Storage Building. 180′ × 90′ in three 30′ bays × 14′ high.
New cladding and ¼″ P.G. in roof slopes.

Crane Building. 226′ × 55′ span × 27′ high.
With 5 ton O.E.T. crane 400/440V. Steel sliding doors, gutters, etc.

Single Story Building. 192′ × 42′6″ × 14′ high. Ready for erection.

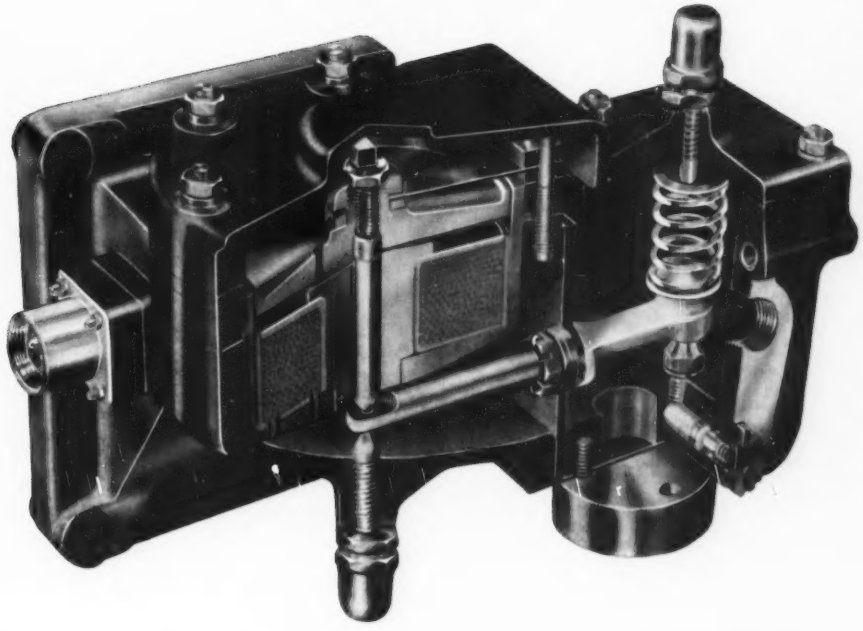
These buildings can be supplied and erected complete

CHAMBERLAIN INDUSTRIES LTD.

STAFFA ROAD, LEYTON E.10

Telephone: LEYtonstone 3678

Printed in Great Britain for the Publishers, ILIFFE & SONS LTD., Dorset House, Stamford Street, London, S.E.1, by SUN PRINTERS LTD., London, and Watford, Herts. Flight can be obtained abroad from the following: AUSTRALIA AND NEW ZEALAND: Gordon & Gotch, Ltd. INDIA: A. H. Wheeler & Co. CANADA: The Wm. Dawson Subscription Service, Ltd.; Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd.; Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class Matter at the New York, U.S.A., Post Office.



L . P . C .

Any size of jet engine can be controlled by this unit acting on the fuel pump in response to a suitable electrical signal, such as may be obtained from an alternator or thermo couple measuring engine speed or jet pipe temperature respectively.

Fuel and Combustion Systems for Gas Turbine Engines

LUCAS

JOSEPH LUCAS (GAS TURBINE EQUIPMENT) LTD., BIRMINGHAM AND BURNLEY
LUCAS-ROTAX LTD., TORONTO 13, CANADA
LUCAS-ROTAX (AUSTRALIA) PTY. LTD., 81 BOUVERIE STREET, MELBOURNE N.3, AUSTRALIA

TEN THOUSAND TONS

of air freight

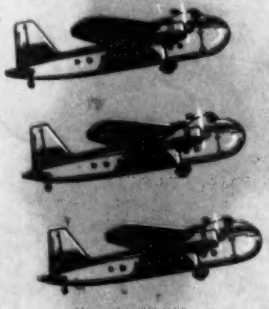
carried in one year

by three

Bristol Freighters

operating in Australia with

AUSTRALIAN NATIONAL AIRWAYS



approx. 30% of the total carried by A.N.A.

Ten thousand tons of freight, 30 per cent of the entire A.N.A. total, were carried by three "Bristol" Freighters during the year ended 1951 —arresting evidence of the influence upon an airline's traffic of the unique cargo-carrying capabilities of the "Bristol" Type 170.

THE Bristol AEROPLANE COMPANY LIMITED ENGLAND

113A